A Hayden Publication

March 1983 $3.00

PERSONAL COMPUTING

Buyer's Guide To MODEMS & PROGRAMS

Canada & International $3.50

Controlling Your Home With Your Computer



Should You Wait To Buy A Computer?

Getting Help From Computer Clubs

Leading A Company Into Computing

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NEC passes your toughest screen test.



If you're getting into "pictures," you can't do better than NEC's new PC-8800 personal computer system. It gives you the highest resolution (640 x 400) of any standard system you can buy.

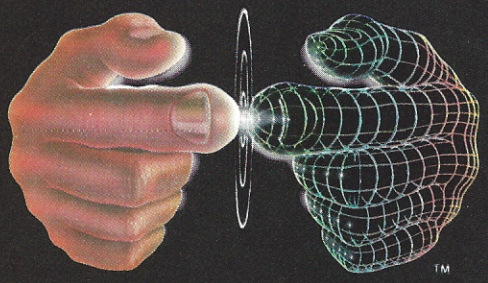
And no other system can give you the PC-8800's high-powered graphics hardware. With R/G/B output and more than 60 distinct colors, it's the perfect system for people who like to paint by numbers.

But it's more than just a pretty face. The PC-8800 is powerful, too, with 8-bit and optional 16-bit capability and up to 256K of RAM. It offers parallel and serial interface, and gives you both color and monochrome capability standard. Either 5¼" or 8" disk drives can be used.

The modular design is attractive and convenient, making the PC-8800 pleasing to your eye in more ways than one.

And a whole range of software is available for the CPM™-based* PC-8800.** You can use it when you're getting down to business or just having fun.

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*TM Digital Research
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CIRCLE 1



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CIRCLE 2

March 1983
Volume 7
Number 3
A Hayden Publication

PERSONAL COMPUTING

FEATURES



Today you don't need technical knowledge to be the master of your own castle. All you need is creativity and a personal computer. Here's how two men have made their houses smarter.
Page 56

COVER PHOTOGRAPHY
GEORGE B. FRY III

ESSAY
Don't Wait To Buy A Computer *49*
A hard look at the reasons why people wait to buy personal computers shows that there's really no reason at all.

ADVANCED
How A Computer Can Control Your Home *56*
Smart houses are possible right now, and making them smart is not as hard as you might think.

PROFESSIONAL/MANAGERIAL
When The Boss Got Into Computing . . . *67*
First he shaved $3000 from a printing project. Next he got to the heart of the problem in one of his plants. Today 32 of his executives are personally computing to try to keep up with him.

PROFESSIONAL/MANAGERIAL
The Artistry Of The Computer Artist *71*
A New York musician and a California artist have integrated personal computers into their arts, creating stunning new forms of music and animation.

PROFESSIONAL/MANAGERIAL
Getting Even In The Fight Against Pollution *77*
Facts count when it comes to arousing citizen action, and on the environmental front facts have to be based on masses of data. Here's how one man uses personal computers to win against uneven odds.

DEPARTMENTS

5 **From the Editor**
Self-confessed tinkerers who are well-versed in practical personal-computing applications of today are the ones who will develop the exciting uses of the future

9 **Letters**
Readers comment on computing your family tree and hard disks

12 **Answers**
Can an electric typewriter be used as a printer?

27 **People in Computing**
Computerized marketplace opens; personal computer helps company exec leave the big city behind

43 **Interview**
Fred Gibbons, president of Software Publishing Corp., talks about inflated software costs and hardware incompatibility

155 **Book Reviews**
How a spreadsheet calculator can aid small businesses; compact computing; words and more words

176 **Games**
Lost Colony: a chance to test your business acumen

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HOME
How To Beat A Bad Memory *83*
One woman's determined effort to list the things she wants to remember—with the aid of a personal computer—so she can forget about forgetting.

BUSINESS
Restoring An American Dream *89*
Entrepreneur Jay DeSerpa, using a computer and a general-ledger package to act as his business manager, is the main mover in a multimillion dollar effort to restore a California town that time almost forgot.

SPECIAL REPORT
Data Communications: A Buyer's Guide To Modems And Software *96*
For $100 to $1000, a modem gives your computer a doorway into the phone lines. With additional software you can go through that doorway into a variety of information and communication services, as well as connect with other personal-computer users.

BUSINESS
The Delightful Discovery Of A Career In Computing *135*
Words may not be a writer's sole support if he has a talent for computing.

EDUCATION
The Helping Hand Of Computer Clubs *142*
Hundreds of computer clubs have sprung up around the country. They're great meeting grounds for both the novice and for the pro wanting to learn new tricks of the trade.

191 **Hardware of the Month**
Apple's new enhanced personal computer, the Apple //e; Qume's new Sprint 11 Plus letter-quality printer

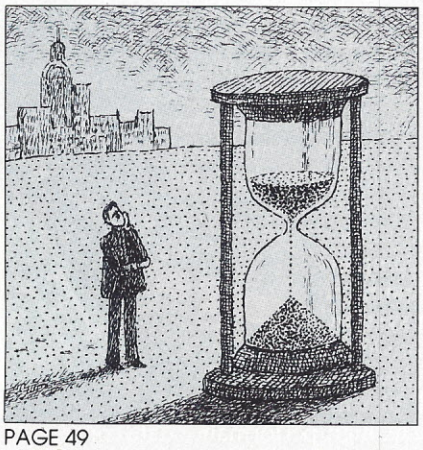
203 **Hardware Index**

227 **Software of the Month**
The Incredible Jack performs file management, word processing, and calculations; V CALC 80 transforms VisiCalc into a wider-screen format

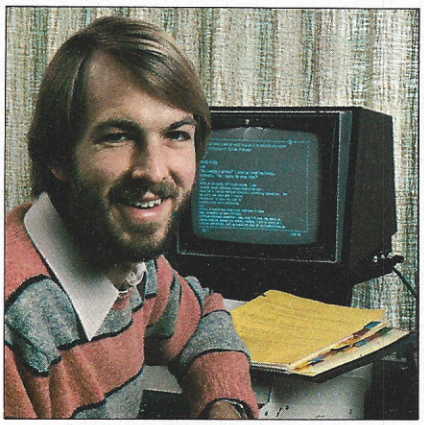
236 **Software Index**

272 **Personal Computing Dealers**

279 **Advertisers' Index**

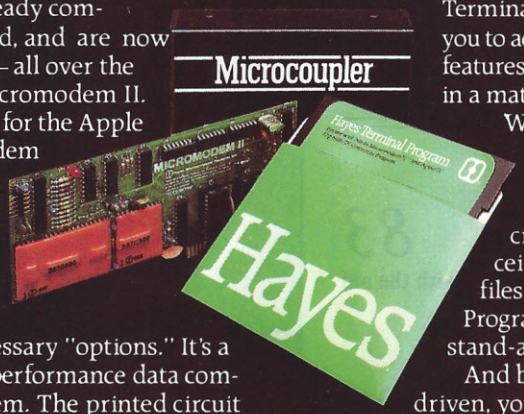








More Apple II owners choose Hayes Micromodem II than any other modem in the world. Compare these features before you buy. You should. It's your money. Thousands of other Apple II owners have already compared, considered, and are now communicating – all over the U.S.A. – with Micromodem II. The best modem for the Apple II. The most modem for your money.



A complete data communication system. Micromodem II is not "base priced" plus necessary "options." It's a complete, high-performance data communication system. The printed circuit board fits – quickly and easily – into your Apple II, eliminating the need for a serial interface card. And the Microcoupler™ (included) connects the Apple II directly to a standard modular telephone jack. Auto-dial and -answer features are built in. Operation can be full or half duplex, with a transmission rate of 300 bps. And it's Bell 103 compatible and FCC approved.

Now there's Hayes Terminal Program, too! Developed by Hayes specifically for Micromodem II, this new Terminal Program allows you to access all the great features of your modem in a matter of seconds. With it, you can use your CP/M,® DOS 3.3 or Pascal formatted disks to create, send, receive, list and delete files. Hayes Terminal Program is a complete, stand-alone disk.

And because it's menu driven, you can choose from a wide variety of options to set your communication parameters – as well as change hardware configuration – directly from the keyboard. It even allows you to generate ASCII characters that are normally not available from Apple keyboards, further extending your capabilities. Incoming data can be printed (on serial or parallel printers) as it's displayed on your screen.

Micromodem II is available with or without the Terminal Program. Buy your modem by itself, or optionally packaged with the Terminal Program disk and user manual at extra cost. The software is also sold separately, for those who already own a Micromodem II.

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CIRCLE 9

PERSONAL COMPUTING

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Computing For The Fun Of It

If a man's home is his castle, as Sir Edward Coke declared in the 17th century, and if a man's mind is extended by the personal computer, as we and others have declared in the 20th century, then putting home and computer together should yield some nifty results.

That's what Senior Editor David Gabel thought when he went to work on this month's cover story, "How A Computer Can Control Your Home," which starts on page 56. And, as Gabel found out, Doug Mosher in San Francisco and Tom Jefferson in Minneapolis are indeed doing some nifty things.

Mosher and Jefferson (and also Gabel) are self-confessed tinkerers. They are men well-versed in the practical applications computing can be put to, and also men intrigued by the fun applications of computing. On their jobs they work with computing. Off their jobs they like to play around with computing to see what else they can do. It's quite natural that the off-job tinkering focuses on home applications.

Before someone rushes to remind us that Sir Edward actually said, "a man's *house* is his castle," rather than *home*, let us quote the poet Edgar A. Guest, who wrote: "It takes a heap o' livin' in a house t' make it home..." Both Mosher and Jefferson, we think you'll agree, are livin' in sufficient heaps to put their houses into the home category.

Sir Edward Coke, you may recall, was an eminent English jurist who became a champion of common law against the encroachments of the royal prerogatives—namely those of King James I. To Sir Edward and his courage we owe a great deal of the concept of personal freedom of thought and action we so cherish and are so prone to take for granted.

Freedom to think and act independently is essential to innovative genius. With the power of personal computing accessible to every home comes the unprecedented ability to find new and better ways of doing things—with computing and through computing.

That's as it should be. If people weren't always trying something new with computing it would be tedious, repetitive drudgery. It's the people who get hooked on computing, the people who play with it because they *want* to, because it's fun, who will develop the exciting applications of the future.

That makes it important fun—so important, we believe, that we'd like to share more of it. To encourage the sharing we'll send a gift certificate worth $500 at your local computer store to the reader who submits the best example of the use of personal computing in a control application in his or her own home.

What do we mean by "best"? We'll be looking for the application of hardware, software, external gadgets, and human ingenuity that we think others can best use and build on. The final judgment of what's best will rest with the editors of *Personal Computing* magazine.

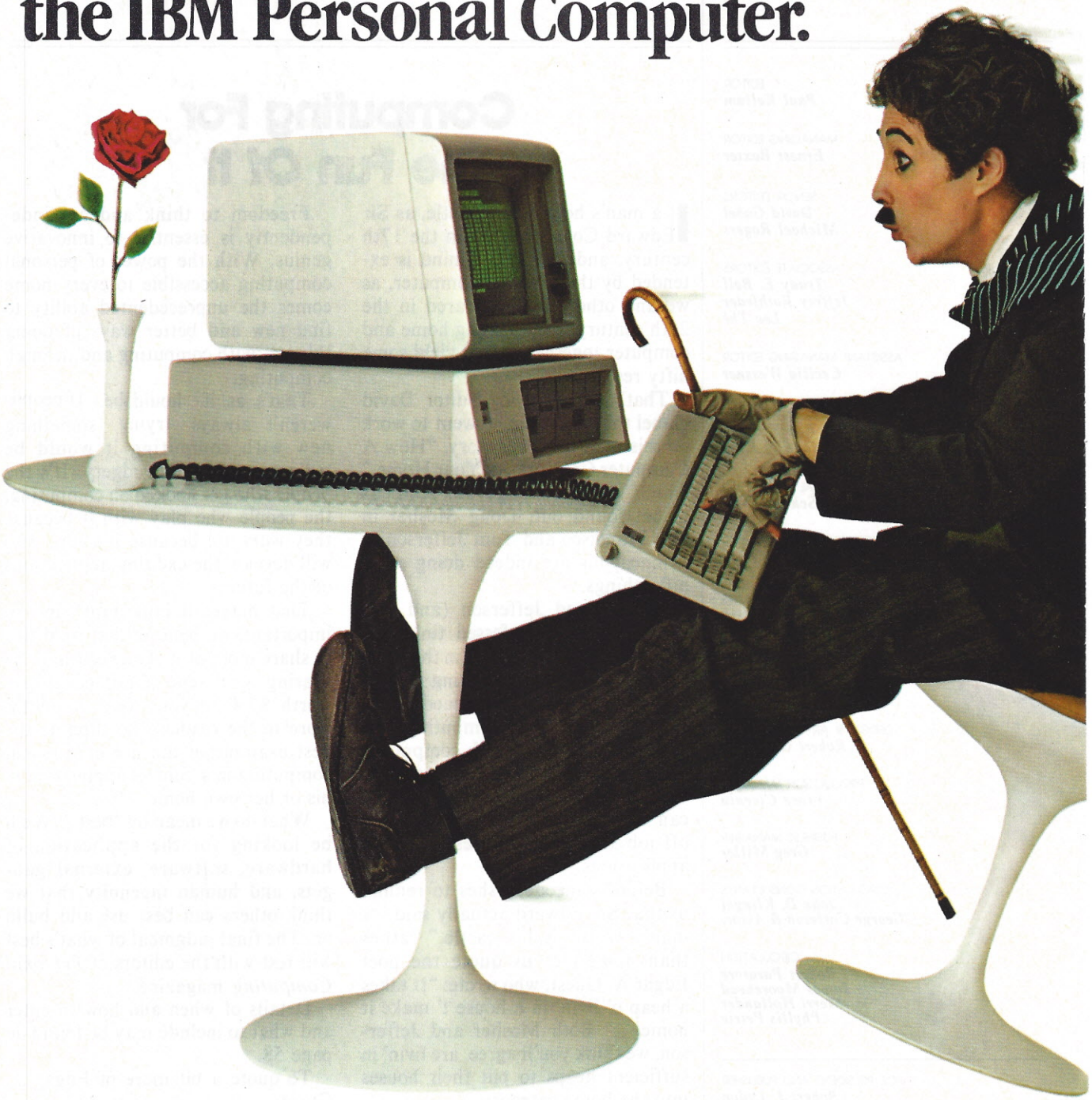
Details of when and how to enter and what to include may be found on page 58.

To quote a bit more of Edgar A. Guest:

Somebody said that it couldn't be done,
But he with a chuckle replied
That "maybe it couldn't," but he would be one
Who wouldn't say so till he'd tried.

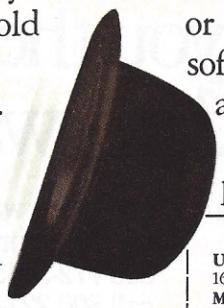
Paul Kellam

How to test drive the IBM Personal Computer.



When you get behind the keyboard of the IBM Personal Computer, hold onto your hat.

It's responsive on short trips. It's reliable on long hauls. And it's passing a lot of the others already on the road.



What's under the hood?

Visit an authorized IBM Personal Computer dealer and test drive the system.

You'll be impressed that a compact with such a great sticker price is also such a powerful performer.

For starters, it's been engineered with *three* microprocessors for better overall responsiveness. A 16-bit microprocessor in the system unit makes the IBM Personal Computer right at home in the fast lane. Another controls the monitor. And there's yet a third in the keyboard. (Put the keyboard on your lap—it's a perfect example of independent suspension.)

There are 10 function keys that help relieve the tedium of repetitious shifting. (Something like driving an automatic instead of a standard.)

And there are high resolution graphics that could come in first—were there a Grand Prix of personal computers. Get a demonstration of the text and graphics mix. And be sure to see it all in living color. (For more specifics, check out the box at right.)

Easy acceleration.

Whether you plan on using the IBM Personal Computer to manage a department, run a business, teach a course, learn a lesson or simply go on a pleasure drive—there's software to head you in the right direction and to help you stay ahead.

While you're at the store, try a few programs—first hand. Even if you've had no computer experience, you can quickly get into gear.

The driver's manual IBM wrote for you will help simplify matters. And the hardware's been designed to do the same.

IBM PERSONAL COMPUTER SPECIFICATIONS

User Memory
16K-512K bytes*
Microprocessor
16-bit, 8088*
Auxiliary Memory
2 optional internal diskette drives, 5¼", 160K bytes or 320K bytes per diskette
Keyboard
83 keys, 6 ft. cord attaches to system unit*
10 function keys*
10-key numeric pad
Tactile feedback*
Diagnostics
Power-on self testing*
Parity checking*

Display Screen
High-resolution*
80 characters x 25 lines
Upper and lower case
Green phosphor screen*
Operating Systems
DOS, UCSD p-System, CP/M-86†
Languages
BASIC, Pascal, FORTRAN, MACRO Assembler, COBOL
Printer
All-points-addressable graphics capability
Bidirectional*
80 characters/second
18 character styles
9 x 9 character matrix*

Permanent Memory
(ROM) 40 bytes*
Color/Graphics
Text mode:
16 colors*
256 characters and symbols in ROM*
Graphics mode:
4-color resolution: 320h x 200v*
Black & white resolution: 640h x 200v*
Simultaneous graphics & text capability*
Communications
RS-232-C interface
Asynchronous or SDLC protocols
Up to 9600 bits per second

*ADVANCED FEATURES FOR PERSONAL COMPUTERS

They won't steer you wrong.

The trained salespeople at your authorized IBM Personal Computer dealer realize that you may never have been in this particular driver's seat before.

They want you to relax. They want you to ask any question you want to ask. They're ready and willing to provide you with all the answers—and to help pick the system and the software right for you.

For more information on where to buy the IBM Personal Computer, call 800-447-4700. In Alaska or Hawaii, call 800-447-0890.

You'll see why the IBM Personal Computer doesn't take a back seat to any other system.

IBM®

The IBM Personal Computer
A tool for modern times

†UCSD p-System is a trademark of the Regents of the University of California. CP/M-86 is a trademark of Digital Research, Inc.

CIRCLE 3

Osborne™ brings you the comparison IBM® and Apple® don't want you to see.

Other computer companies dazzle buyers with an array of options and add-ons that makes the final price hard to determine and makes the computer hard to buy, complex to assemble, and very difficult to carry.

We believe in making personal computers that are easy to learn and use. And that starts with making computers easy to *buy*.

The Osborne 1™ Personal Business Computer. One simple price, $1795, buys it all.

And it all comes in a portable case you can take with you wherever you work. Because once you go to work with an Osborne, you won't want to work any other way.

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COMPUTER CORPORATION

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Computer with 64K RAM, two floppy drives[A], keyboard and CRT:	$1795	$3240[B]	$3120[C]
Serial communications:	INCLUDED	EXTRA COST	EXTRA COST
Modem Connection:	INCLUDED	EXTRA COST	EXTRA COST
IEEE 488 Instrument communications:	INCLUDED	EXTRA COST	EXTRA COST
BASIC interpreter[D]:	INCLUDED	INCLUDED	INCLUDED
Business BASIC[E]:	INCLUDED	EXTRA COST	EXTRA COST
CP/M® Control Program:	INCLUDED	EXTRA COST	F (see below)
Word Processing[G]:	INCLUDED	EXTRA COST	EXTRA COST
Electronic Spreadsheet[H]:	INCLUDED	EXTRA COST	EXTRA COST
Carrying Case:	INCLUDED	EXTRA COST	EXTRA COST
TOTAL PRICE[I]:	**$1795**	**$4000–4700**	**$4000–4700**

A. The Osborne 1™ includes two built-in 100K byte floppy disk drives. The IBM® and APPLE II® drives provide approximately 160K bytes of storage. **B.** From the IBM Product Center Personal Computer Price Schedule. **C.** From the Apple Computer Suggested Retail Price List. **D.** The Osborne includes MBASIC® from Microsoft. **E.** The Osborne includes CBASIC®, a business-oriented BASIC language from Digital Research.™ **F.** The Osborne includes CP/M®, the industry-standard control program from Digital Research. The list of software packages which will run with CP/M is considerable. IBM offers CP/M 86 (a version of CP/M) at extra cost. There are optional hardware systems which allow the Apple II to run CP/M; the Apple II control program is highly comparable to CP/M. **G.** The Osborne includes WORDSTAR® word processing with MAILMERGE®—products of MicroPro™ International. **H.** The Osborne includes SUPERCALC™, the electronic spreadsheet system from Sorcim Corporation. **I.** Exact price comparisons cannot be presented, because the software and hardware options chosen to create the "equivalent" of the Osborne 1 Personal Business Computer vary in price. The range indicated was computed using price lists from IBM and Apple. Documentation of the computations are available on request from Osborne Computer Corporation. Trademarks: OSBORNE 1: Osborne Computer Corporation; SUPERCALC: Sorcim Corporation; Digital Research: Digital Research, Inc.; Registered Trademarks: WORDSTAR, MAILMERGE: MicroPro International Corporation of San Rafael, CA; MBASIC: Microsoft; CBASIC, CP/M: Digital Research, Inc.; IBM: IBM Corporation; Apple, Apple II: Apple Computer Corporation.

CIRCLE 4

Is Computing Your Family Tree Too Difficult?

In reference to your article "Computing Your Family Tree" on page 112 of the January 1983 issue, I would like to make a few observations.

I began to trace my family tree in late 1966. The task was, and is, most exciting and rewarding, but the development of masses of information and a plethora of cousins and lines related by marriage proved to be a task that seemed almost insurmountable—until I came upon a system of arrangement called a compendium.

The only compendium I ever saw is in the genealogical section of the Oregon State Library, so I know that the concept is not widely used. With my own modifications it proved to be the very format that allowed me to separate the entire family into an orderly format that gave the generation code as the ruling factor in the recovery process.

When dealing with several families descended from a common ancestor who fought in the American Revolution, one deals with at least six, and probably seven generations. A word-processing format can recall the entire single generation, or a specific alphabetized name in a generation, together with the full data available for that entry. Since the entry will give both parents and offspring, it is only necessary to move forward and back to establish a more common family tree. A printout can give a complete index of the entire family.

Happy hunting.

John E. Davis
SALEM, OR

I read with great interest your article "Computing Your Family Tree" on page 112 of the January 1983 issue. I wonder if you might be able to provide me with an address for the *Genealogical Computing* newsletter.

In the short time I have subscribed to your magazine, I have found it to be the most informative and readable publication for a personal-computing enthusiast. Thank you in advance for your help in locating the newsletter.

Jay Grant
EASTHAMPTON, MA

The address of the Genealogical Computing *newsletter is 5102 Pommeroy Dr., Fairfax, VA 22032.*—The Editors

"Hayden's *Personal Computing* magazine's accuracy policy: to make diligent efforts to insure the accuracy of editorial material. To publish prompt corrections whenever inaccuracies are brought to our attention. Corrections appear in 'Letters.' To encourage our readers as responsible members of our business community to report to us misleading or fraudulent advertising. To refuse any advertisement deemed to be misleading or fraudulent."

DEBATE OVER SAT GUESSING

Krell's College Board SAT Preparation Series is the subject of a letter in your January 1983 issue, page 8. In it Paul Geisert states that Krell's SAT Preparation Series advises students not to guess on SAT exams. As the author of this series I can assure you this is not true.

The series provides students with the means to measure the impact of whatever guessing strategies they wish to employ. In this way they can adopt whatever strategy is most appropriate to their own needs and skills.

Geisert's statement that students should always guess when they are uncertain is just too sweetening. Time may be wasted by students who hope to eliminate impossible answers in order to improve their chances. In addition, the ETS penchant for creating attractive wrong answers must be considered a powerful snare for the unwary.

We believe that it is precisely because we concentrate on teaching necessary skills, as opposed to emphasizing test-taking strategies, that the users of Krell's SAT series average in excess of a 100 percent mean increase in SAT scores.

Edward I. Friedland
CHAIRMAN OF THE BOARD
KRELL SOFTWARE CORP.
STONY BROOK, NY

AN UPDATE ON DISK ACCESS TIME

The article "Hard Disk Drives: Are They Worth the Price" on page 80 of the January 1983 issue is amazingly comprehensive and informative. With so many such systems on the market you can't avoid missing a few, but this doesn't detract from the relevance of the piece. My one criticism is that other readers may find the discussion of disk access times as misleading as I did.

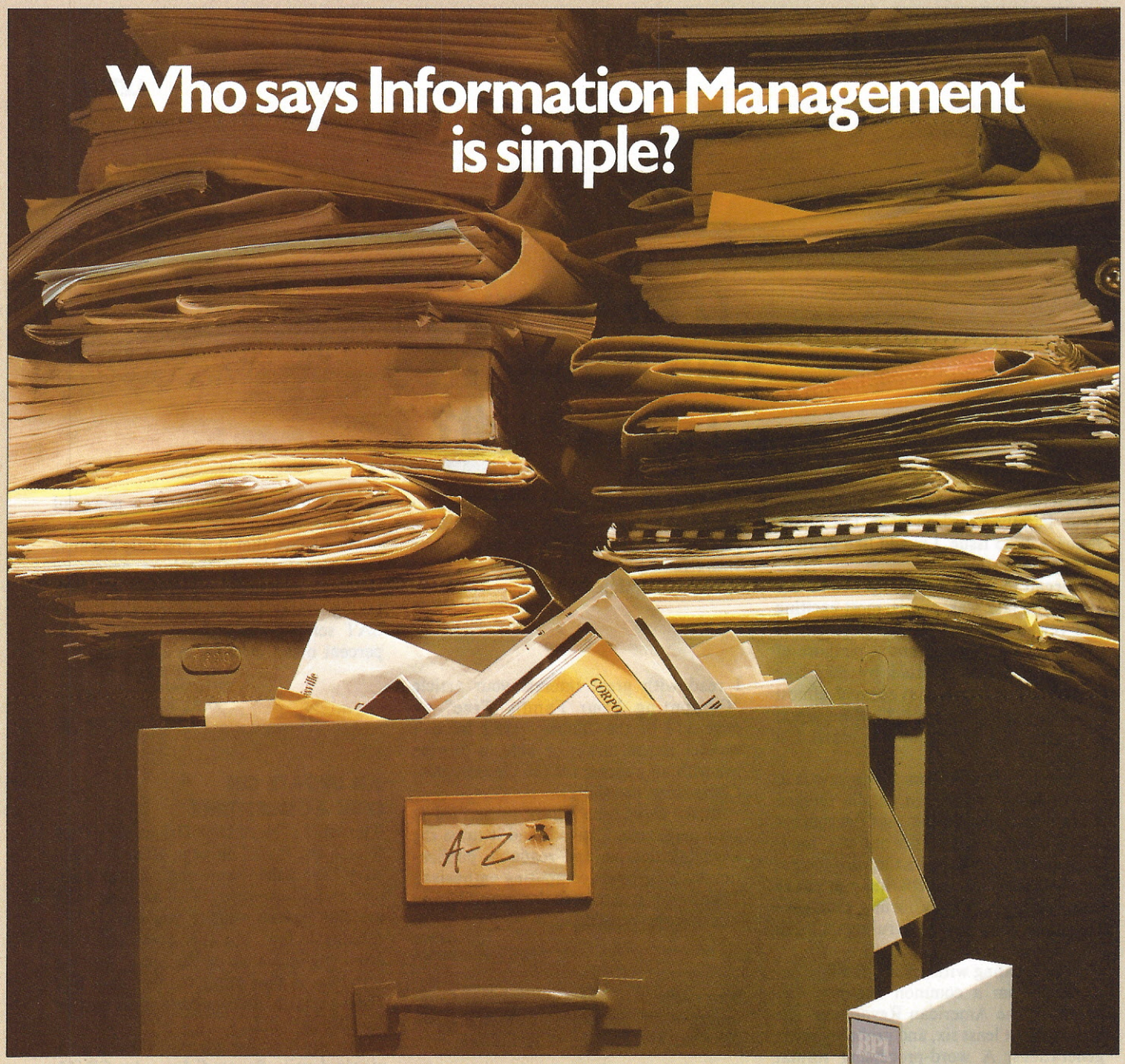
On my antique system with 8-inch, single-density floppy disks under CP/M, the 21k file save takes three to 10 seconds, depending on disk format. The figures quoted in the article are hardly acceptable for a system in the price range where a hard disk would be under consideration.

Under CP/M 2.2 the directory is read after each 16k data transfer in case the disk was changed. This feature can be removed for fixed media. Thus, much of the speed differential depends on whether you want to be reminded when you need to type C after changing media, not on whether the disk is hard or floppy.

It is understandable that few system vendors will invest the effort to improve the performances of their basic systems, but the consumer should not accept an expensive hardware change if a software correction would be a better solution.

T.C. Prince
MARBLEHEAD, MA

Who says Information Management is simple?



We do. Whether you are managing a business or your personal filing cabinet, your success may depend upon your ability to process information. Tools can help.

BPI Systems has sold thousands of accounting systems in response to the need for effective management tools. Now, BPI and Aims Plus introduce the BPI Information Management System.

This system instantly expands your ability to store, search, retrieve and compare very large amounts of information. The BPI Information Management System is one of the most powerful tools available today for microcomputers.

You can easily build your input screens in any format that you desire. There is no need for laborious planning. You may add, delete, and redefine items in your records any time without rebuilding the entire file. The system even allows you to design an unlimited number of reports.

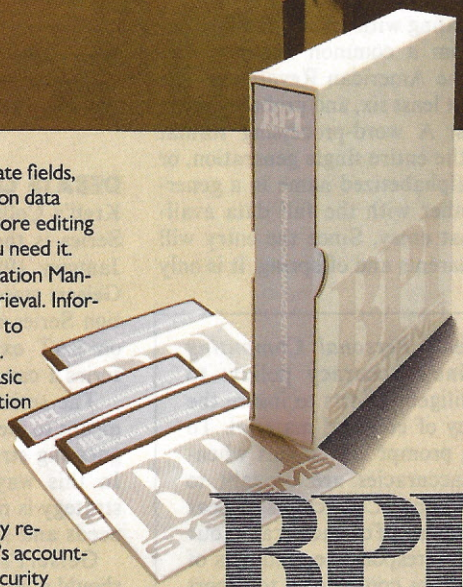
The BPI Information Management System automatically edits your entries for proper format of numeric, alphanumeric and date fields, thereby preventing the most common data entry errors. You can even define more editing criteria whenever and wherever you need it.

The real power of the BPI Information Management System is found in data retrieval. Information in any field can be compared to other fields and displayed in seconds. Since the system performs all the basic math functions, you can see information expressed in percentages, rank order, alphanumeric sequence, or even as graphs. And you can switch formats with the stroke of one key.

This system can even automatically retrieve information directly from BPI's accounting systems.* And BPI's password security protects your sensitive material.

The BPI Information Management System is a tool which enables you to do the things you always thought a computer should do. It's just that simple.

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CIRCLE 5

LETTERS

BITTEN BY THE EDUCATIONAL COMPUTING BUG

I read with great interest "The Future is Kids and Computers" on page 26 of your December 1982 issue, and "Gee Whiz, These Computing Kids" on page 58 of the same issue. As an elementary school teacher, I thoroughly agree with Frank Winter of Commodore, Canada, who said, "A personal computer can do drill and practice better than a teacher. The teacher can then go around to individual students and use his/her talents best." What better aid could be provided to a teacher? Yet why are so many hesitant to take the computer plunge?

I took a two-week course last summer on computers in the classroom. Being bitten by the computer bug, I started to investigate the possibilities of how I could get a computer for my classroom. But to no avail.

Local and state funding in Ohio has been butchered to the bone. One of our district's PTOs offered to buy a few VIC-20s, but the teachers said the money could be used elsewhere. I couldn't pick up on their rejection because I am from the "other side of the district." Being a rural district, we do not have any companies or industries that would be willing to contribute to the cause. So here I am, an anxious and frustrated educator. I want to be a part of the future rather than a piece of the past.

I will keep looking and hoping. If any of your readers have any suggestions, I'd like to know where to turn next.

Keep up the good work. I enjoy your magazine.

Cindy Eusey
BUCYRUS, OH

REDESIGNING THE HOUSE OF THE FUTURE

Your October 1982 article "The Smart House Comes of Age" (page 112) brings to mind a point I've been making recently to friends who are building or remodeling their homes. It's a very good idea to "bury" signal cables in the walls of homes if the paneling is ever removed and the framing underneath exposed.

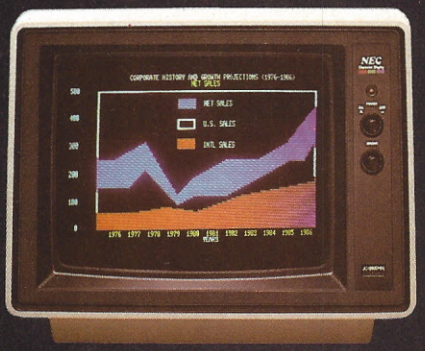
I recommend running both a multiwire cable—ordinary 26-pair, 22-gauge telephone cable, for example—and a coaxial RG 59-U TV cable along all four walls of each room. They should also run from each room to some central point like the basement or crawl space. Ideally, this should be laid out so that any point in the house can be connected to any other point through not more than about 50 feet of cable. The cables should run through the home's 2 by 4s, and be stapled down at every second one, with about four to six inches of slack. Obviously, these cables should be kept away from AC power lines, but building codes do not require shielding or junction boxes as long as low voltages and currents are carried. If the multiwire cable is to be used for data communications, however, shielding might be a good idea, to avoid radio interference.

When this is done, you can open the wall at any future time and connect any kind of communications, signaling, or control device you need. The multiwire cable is moderately expensive, but compare this to the cost of pulling cable in closed walls, and consider the ugliness of exposed wiring. I'm confident that anyone who follows this practice will never be sorry; my friends who have done so have certainly not been.

Here are three examples of how this cabling is useful: First, it can be used to install telephone jacks, a TV antenna, cablevision hookups, and can be used for data communications. Second, it can be used for security-system sensors. I recently installed a home burglar-alarm system, and this kind of cabling would have saved me at least 40 hours of unpleasant work. Finally, the cabling can be used for the kinds of sensors and control system Mike Barlow mentions in his article. I've recently begun experimenting with a home control system, using my S-100 bus computer and two switcher boards made by Mullen Computer Products. These boards provide eight channels each of input and output. They convert signal levels in my computer to "real world" voltages and currents, and are very easy to interface to appliances and environmental control systems.

It's said that this is the beginning of the information age. I think we should build our houses to anticipate the many applications for control and communications which are beginning to seem so attractive and practical.

Roger Mastrude
BERKELEY, CA



Get the total picture.

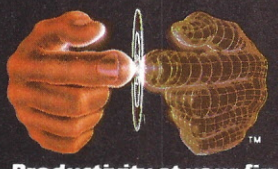
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CIRCLE 7

Can An Electric Typewriter Be Used As A Printer?

In this monthly column, "Answers," we will respond to your most frequently asked general questions about personal computing. Please send your questions to: Answers, Personal Computing, *50 Essex St., Rochelle Park, NJ 07662.*

Q: What is the electromechanical device that converts an electric typewriter to a computer printer?

A: We referred to such a conversion device in our special report on printers. (See "If It's Worth Its Weight in Paper," *Personal Computing*, July 1982, page 66.) The reference there was to the possibility of converting a plain, old, ordinary electric typewriter into a computer printer. Plain, old, ordinary electric typewriters accept data from keyboards only, while electronic typewriters have provisions for accepting data to be typed in digital form from some outside source.

We never should've mentioned the devices, because they apparently don't exist anymore. That'll teach us to shoot our mouths off!

At the time the report was written, we had seen advertisements for this kind of device, and in fact had talked to some people who had used them. But now these people are out of touch, and a diligent search of files, publications, etc., failed to turn up even one of the pesky devices.

In preparing this answer, though, we spoke to Tim Wild from Mediamix in Los Angeles. Mediamix makes an interface box that allows an electronic typewriter to be driven like a printer from a computer.

When we asked Wild about the bolt-on, key-pushing peripheral we had seen offered, he said, "I haven't seen their ads in quite a while." We allowed as how we hadn't either. "I remember them, though," he said. We agreed with that, too.

That does you no good, though, because the company Wild had in mind apparently doesn't manufacture the device anymore. There was another company, called Rochester Data, that used to make them, but no more.

But don't fret. Wild says that he used to get calls about his product, and invariably the conversation would contain a phrase like, "Now this isn't one of those bolt-on things, is it? I knew a guy who had one of those and it never worked right."

Apparently, the problem with those devices was that their specifications were just not good enough, and their reliability wasn't what it should have been. Then, too, electric typewriters aren't built to take continuous duty at printer speeds. Electronic typewriters, on the other hand, are, so using one of them as a printer is supposed to be OK.

Perhaps that's why you don't see ads for the bolt-on key pushers anymore. Anyway, we apologize for that little slip.

Q: Can any dot-matrix printers do letter-quality printing? If so, what should I look for? I don't want to spend more than $1000 for a printer.

A: We can understand your wanting the relative economy and speed of dot-matrix printing, which uses little wires in the printhead to form characters from little dots. However, no dot-matrix printer we have seen absolutely matches the print quality of an IBM Selectric or good printwheel-type printer. You always see the dots, although the combined emphasized/doublestrike/high density modes of some come very, very close to letter quality. And the fabric ribbons dot-matrix printers have to use because the action is too violent for carbon ribbons also conspire to keep print quality a hair below that of the best printwheel-type machines.

If you find "very, very close" acceptable for your needs, here's what to look for in a dot-matrix printer:

- A dense dot matrix. You'll need at least 7 by 9 cells, preferably more. The 5 by 7 cells of inexpensive dot-matrix printers don't allow for descenders on letters like p, q, y, g.
- Proportional letter spacing. This allows each letter to occupy a horizontal space appropriate to its width. This is not to be confused with right justification, which merely makes the right margin even. This lets a user graduate from the typewritten to the printed look more than any other single feature.
- Emphasized mode available. This may run half the speed of the normal mode, and allows for a much darker character instead of the light printing characteristic of inexpensive dot-matrix printers.
- Multiple strike mode. This prints the character, shifts slightly, and prints it again, filling in the spaces between the dots. This makes for a more fully formed character.

• Condensed mode. This allows 132-column tabular data to be printed on 8½- by 11-inch paper. It's good for tables and accounting.
• Boldface, underline, italics, multiple font, superscript and subscript capability, foreign character sets, technical character sets such as mathematical, engineering. These enhancements allow a user to duplicate the features of printed text, and may help to make up for the fact that the print still doesn't replicate the smooth, crisp density of printwheel printers.
• Availability of sheet feeders. These are necessary if you need to automate the printing out of individual sheets of paper instead of the fanfold sheets common to dot-matrix printers.
• Price. Some letter-quality printers retail for as little as $900 or so, though most still cost well over $1000. You might look into these before you get that dot-matrix machine.

Q: The article about monitors in your December 1982 issue talked about TV sets as inexpensive monitors. It also said that *The Cheap Video Cookbook* by Don Lancaster gave information about using them. Where can I get the book so I can learn to hook up my VIC-20 to my TV?

A: Don Lancaster has written a number of cookbooks for Howard W. Sams & Co., 4300 W. 62nd St., Indianapolis, Ind. *The Cheap Video Cookbook* was one of his early ones, in which he gave circuitry and directions for taking the stream of ASCII characters the computer puts out and getting the characters onto the screen of the computer. You can get a copy of this book by writing to the publisher. You might be able to find it at a computer store.

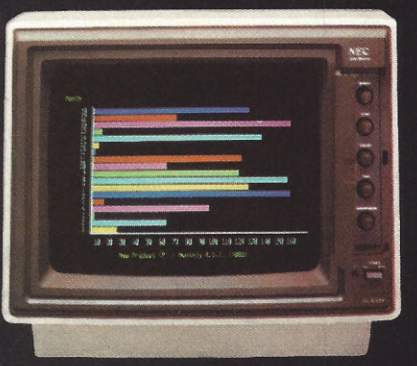
But a word of caution. Your question said you want a set to work with your VIC-20. The VIC is designed to work with TV sets with no hassle. If you can't get it to work with any but the most expensive color TV, we recommend you get a service establishment to check out the computer and the TV that refuses to display the computer's information. There's probably some simple thing out of whack on one or the other. Or both.

Q: How do I transfer files between two different computers? I own a Radio Shack TRS-80 Model 16 and a North Star Advantage.

A: There are quite a few ways to transfer files between two different kinds of computers depending on whether or not you want to link the computers with software and modems—if the computers are in different locations—or connect the machines directly to one another with a cable—if the computers are within 100 feet of each other.

Almost all personal computers can transmit and receive data in ASCII code—a convention specifying which byte represents which letter, number, or symbol. So once you have the computers physically linked (by modem or cable) and set up with the appropriate communications software for your machines, you should be able to tranfer the files. (The special report, Data Communications: A Buyer's Guide to Modems and Software, on page 96 of this issue, has more details and lists software packages that could be used to solve your particular problem.)

To hook up your two computers by cable you have to get an RS-232-C cable having male DB-25 connectors at each end. North Star makes such cables for $65 (8 feet), $85 (25 feet), and $165 (100 feet), or you can have your dealer make one up for you (usually for more money). Now plug the cable into the serial ports in the back of each computer and you're linked. One thing to remember: The TRS-80 has a second serial port as well. If you have a printer in that port, make sure it's on when you're



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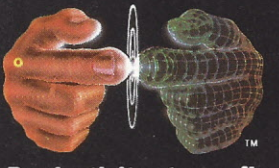
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CIRCLE 6



transferring files. Otherwise plug the supplied port terminator (dummy connector) into the unused port. That's the hardware part.

As far as telecomputing software for your two computers is concerned, one proven package is Crosstalk, from Microstuf, Inc. in Atlanta. This particular package works with almost any two computers in either CP/M or MS-DOS operating systems. If you call Microstuf's hotline at (404) 952-0267, they will tell you how to link your particular computers for transferring files. Since Crosstalk is copy-protected, you'll need to buy two packages—one for each end of the transfer—for $390 total. You can also use Crosstalk with a modem to access information utilities and other computers via the phone lines.

The physical cabling between these particular computers obscures a problem that often arises: There are two basic kinds of RS-232-C ports, called DCE (Data Communications Equipment) and DTE (Data Terminal Equipment). The only difference between these two is that two of the wires going to two of the pins are reversed. The Advantage and the Model 16 happen to have dissimilar ports so, for example, if you have a DCE connector on the Model 16 you have to have a DCE connector on the Advantage. Having the same connector at each end of the cable (DCE or DTE—it doesn't matter) will let one computer's output talk to the other's input. For computers with similar ports, such as two TRS-80 Model 16s, you would have to have a DCE connector on one and a DTE connector on the other. You could also use a device such as Radio Shack's No-Modem connector box ($29.95) to connect computers with similar ports.

Even with quite dissimilar computers running different operating systems, file transfers can be made. At *Personal Computing* we regularly transfer data between Radio Shack TRS-80 Model III and Apple II Plus computers, using modems and a variety of software to hook the computers into the phone lines. There are many mysteries to telecomputing, however, and it would be prudent to get some sort of assurance from your dealer that the particular hardware/software mix you buy will, in fact, effect the file transfers you want.

Q: Can you tell me the difference between letter-, correspondence- and business-quality printers?

A: When people talk about letter-quality printers, they mean a printer that gives fully formed characters. There are several types.

First are impact machines, like daisywheel printers, that have some sort of hammer mechanism causing a metal or plastic character to strike the paper through a ribbon, thus depositing the image of the character on the paper. They produce typewriter-like printing.

Next are laser printers. These work like a copy machine, except the light source is a laser, not light reflected from a piece of paper. The laser beam is guided to imprint an image on some photosensitive device, and then the page is printed by bringing paper in contact with the light-sensitized surface. Chemical toners and fixers make the actual image.

Finally, ink-jet printers form their characters by directing streams of charged ink at the paper. The ink is electromagnetically deflected after it leaves the nozzle to form the character.

Letter-quality impact printers are generally slow, except for line printers used in data-processing shops. Moreover, the cost of a line printer is prohibitive for personal applications. Letter-quality impact printers are also fairly expensive. In recent months the cost of the least expensive of them has come down. You can get a daisywheel printer for under $1000. But in general, the lower the cost, the

(continued on page 21)



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Prints clear original and up to three copies simultaneously

*Special cables may be necessary. Contact your local NEC Home Electronics dealer



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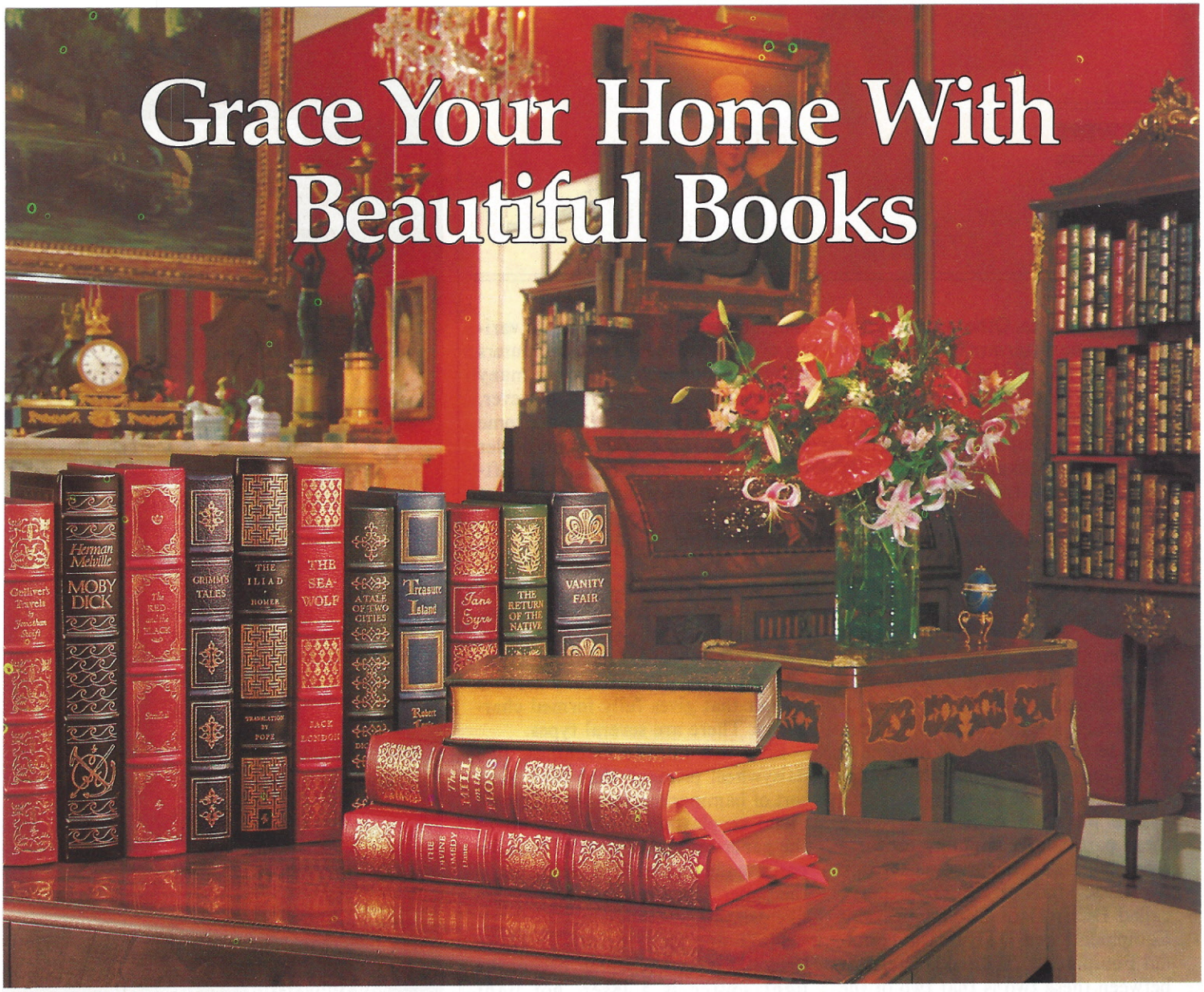
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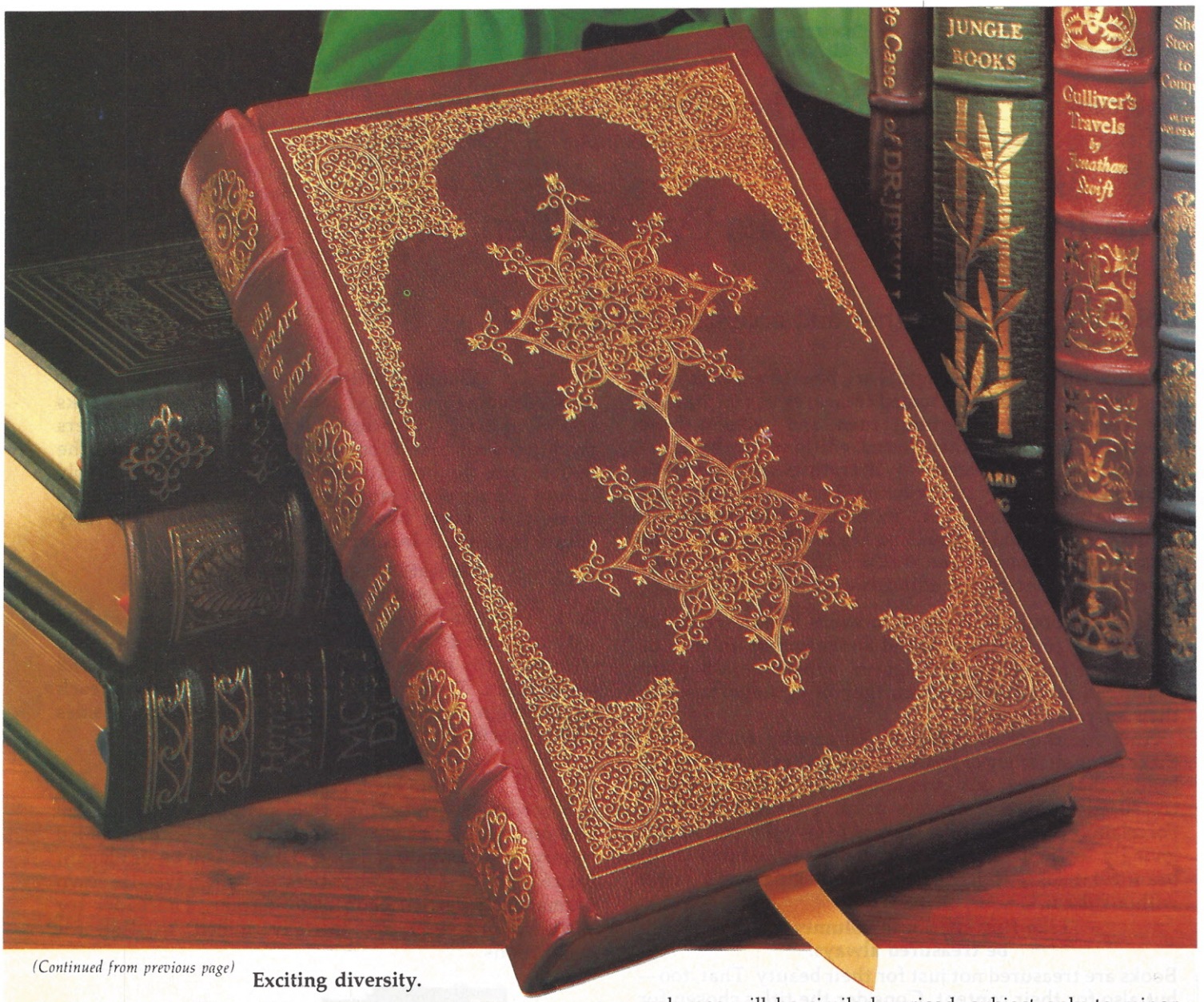
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(continued on next page)





(Continued from previous page)

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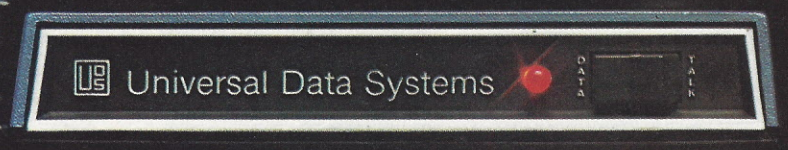
CIRCLE 12

FIVE OF A KIND

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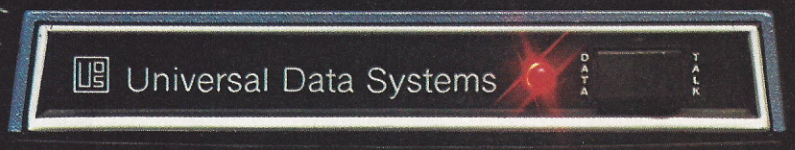


212 LP
originate/answer
1200 bps



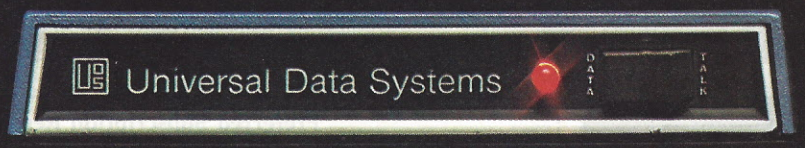
$495
(quantity one)

202S LP
auto-answer
1200 bps



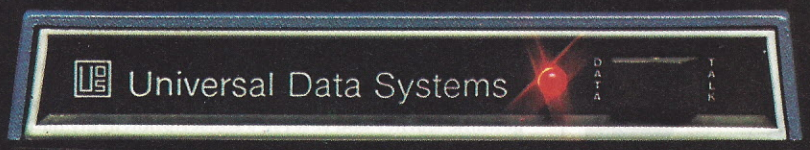
$295
(quantity one)

202 LP
1200 bps



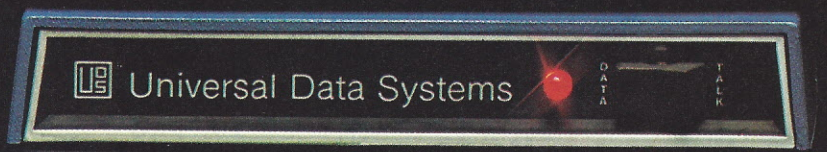
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103J LP
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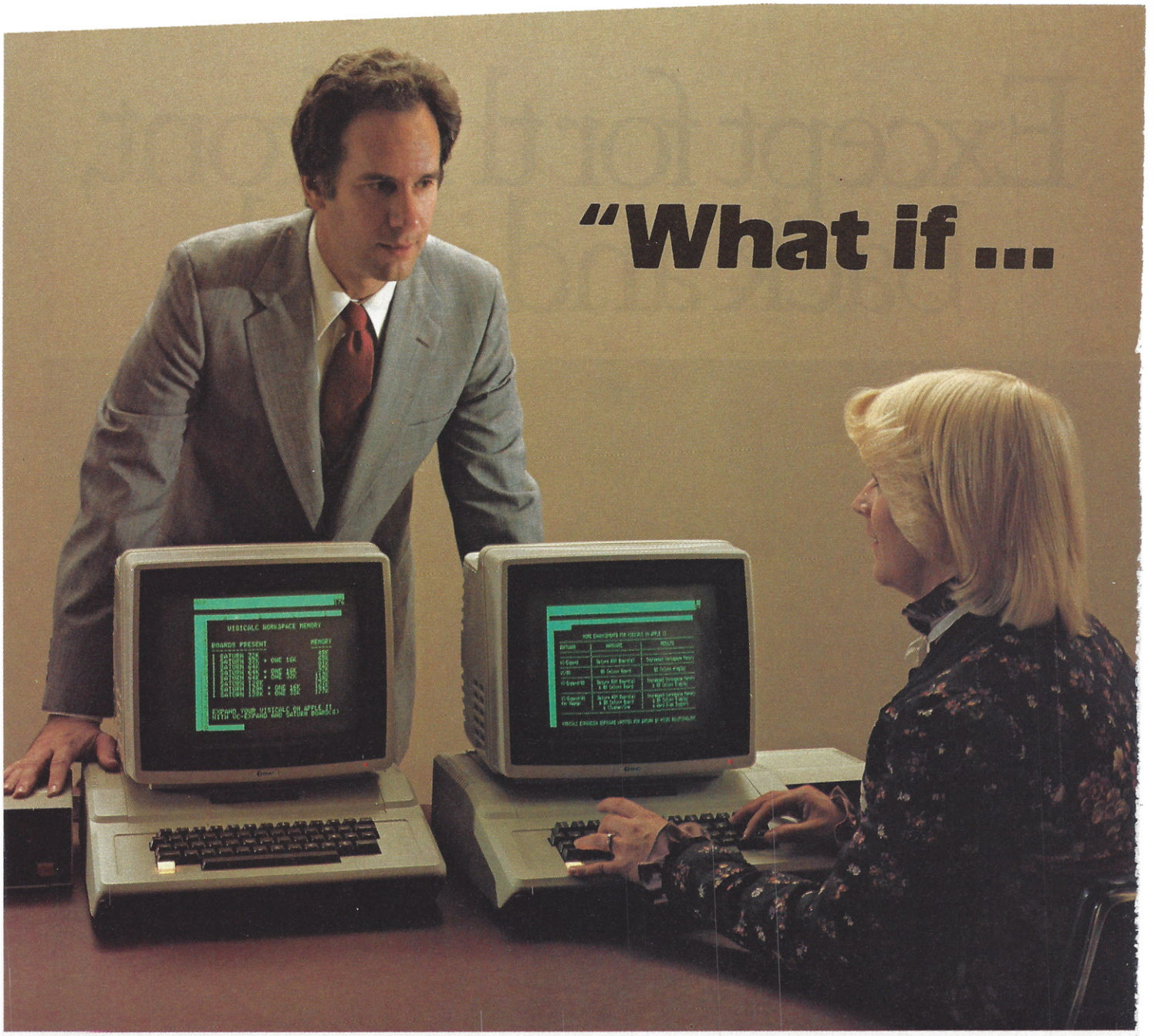
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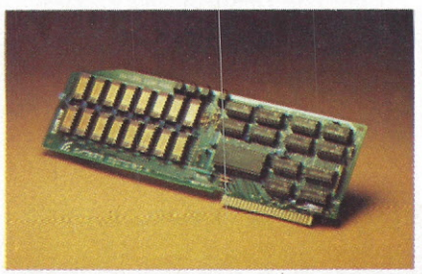
CIRCLE 51

Created by Dayner/Hall, Inc., Winter Park, FL



I run out of memory?"

Most people *do* run out of memory with only 18K VisiCalc* workspace. But you can expand your Apple II* to 177K VisiCalc memory! You can also get 80-column display, lower case letters, and hard disk support—all without buying a bigger computer.



The Saturn expansion system for VisiCalc consists of a preboot diskette, one or more plug-in RAM boards, and an optional 80-column display board. You can put the Saturn boards in any slot. And with all that memory, our software lets you save files on more than one diskette.

Each Saturn RAM board includes additional software for other programming applications. So your BASIC, PASCAL, and CP/M programs get an extra bonus.

Ask your computer dealer for more details about the Saturn memory expansion systems. See how much bigger and better your models can become!

*VisiCalc is a registered trademark of VisiCorp. Apple II is a registered trademark of Apple Computers, Inc.

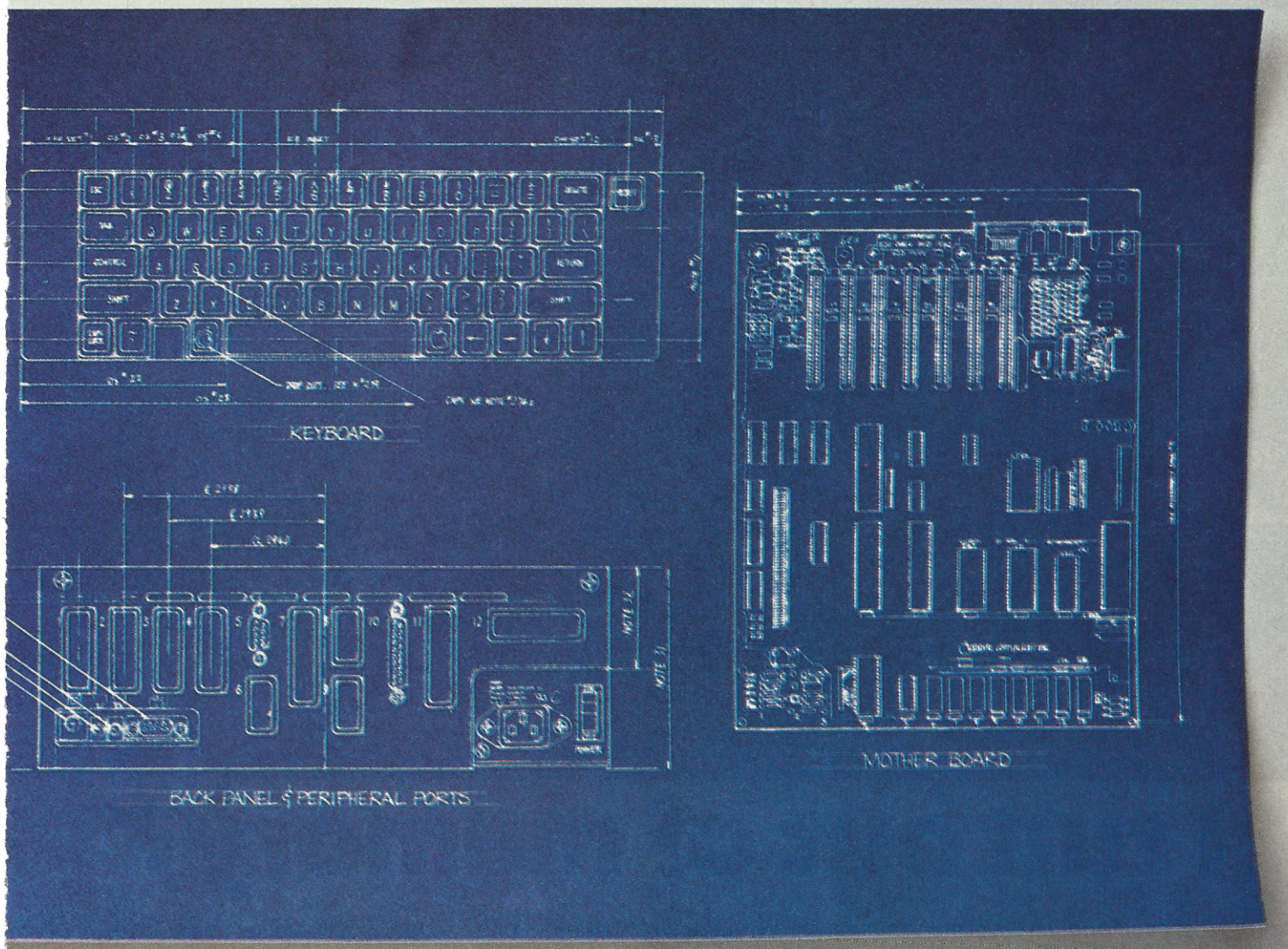
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CIRCLE 140

Except for the front, back and inside.



Self-diagnostics. That's a special feature that makes it easy to give your computer a thorough check-up.

Plus an even more reliable design. Achieved by reducing the number of components—which is to say, the number of things that could go wrong.

And bear in mind, the IIe still has all those other virtues that made the Apple II so very popular. Including access to more accessories, peripheral devices and software than any other personal computer you can buy.

So visit any of our over 1300 authorized dealers, and see the newest Apple for yourself.

Like the original, it's rather extraordinary. But then some things never change.

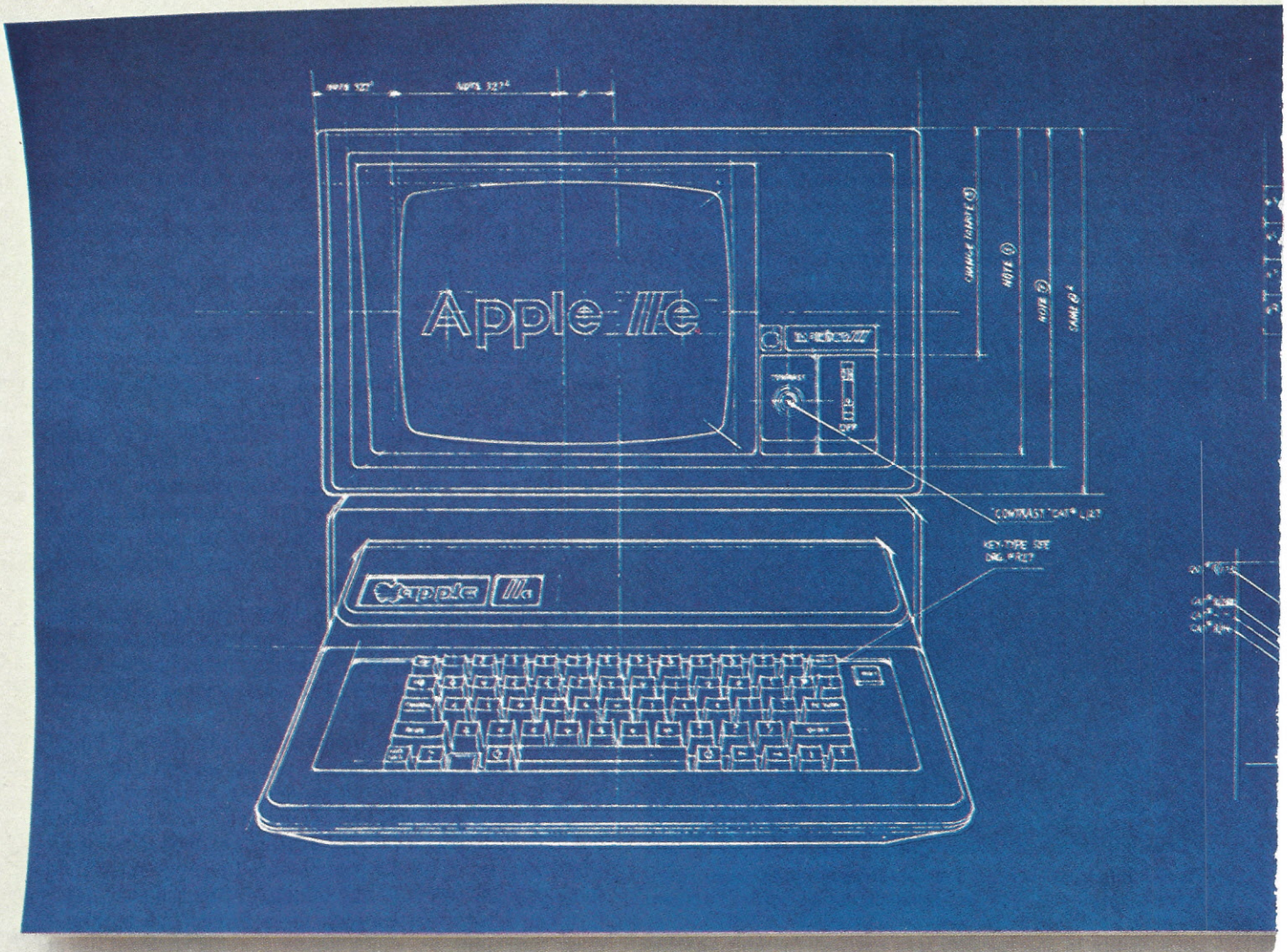
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CIRCLE 22

It's the same old Apple II.



For years, people have been trying to build a better Apple® II.

It finally happened.

Meet the Apple IIe, an impressive new version of a most impressive machine.

The "e" means enhanced. Which means a bundle of new features:

A standard memory of 64K (versus 48K) that's easily expandable. So you can create fatter files and crunch larger numbers of numbers.

A new, improved keyboard, with a complete set of ASCII standard characters. Plus full cursor controls, programmable function keys, and a rapid auto-repeat feature built into every key on the board.

Both upper and lower case characters. (And if you want to see more of them on the screen at one time, a low cost 80-column text card is available.)

Improved peripheral ports. Which make it a lot easier to connect and disconnect game controllers, printers and all those other wonderful things that go with an Apple Personal Computer.

Leaving The Big City Behind

Running a growing business from the road can be a tad tricky—especially if your corporate office is the back of a van. But David Ulmer, an inventor of specialized hardware and software products, is doing exactly that. He uses his Osborne 1 portable personal computer and The Source to keep his business on the road to success.

Ulmer had a good job in Los Angeles working for various microprocessor-based hardware and software developers before he started his company, UNETIS. But the pace of life in the big city was too fast for him and the surroundings were stifling his creativity. So Ulmer gave up his job, moved to the backwoods of Oregon, and started his own company with one employee, himself.



David Ulmer runs his newly formed software and hardware development company, UNETIS, as he looks out his "office" window.

But running a company and doing all of the software and hardware development can turn out to be quite a work load for one person. Ulmer needed help in developing his products. "When I was in Los Angeles, there were plenty of places to turn for that help," he says. "Up here, I would have to make dozens of phone calls and bother a lot of people who either can't or don't want to help me."

So, he decided, the kind of help he needed had to come from people who were not only interested in designing new hardware and software, but who also wanted to get involved in a part-time business. But how was he going to get these helpers? Solution: networking.

Ulmer subscribed to The Source, CompuServe, and EIES, and found that he was able to post questions and requests for information that were seen by thousands of people. He soon found people who would almost always be able to help him. Then he hatched the idea of paying people by giving them a percentage of the profit he earned on his inventions.

Since most of the work Ulmer and his new associates were going to do was taking place over The Source, he decided to advertise for interested people on the data base's various bulletin boards. He also recruited some of his friends as associates. The word-of-mouth method proved to be an effective recruiting tool.

Company literature describes UNETIS as a "completely distributed, decentralized corporation. A corporation of new workstyles and lifestyles made possible through the use of computer and telecommunications technology. UNETIS associates work at home, or outdoors, or wherever they want, and enjoy the freedom of managing their time and lives."

Freedom is also realized by Ulmer in the type of personal computer he has chosen to use in his business. Since the Osborne 1 is a portable machine and has built-in disk drives, he can pack it up at any time, stash it in the back of his van, and just drive.

"I drive until I find a particularly pretty place. If I need to use a network I park near a public phone (Ulmer has a cable in his van that allows him to connect from his modem to a pay phone) and get to work," he says. "Where I work is as important to my creativity as the kind of work I'm doing. I also need a place where I can get out and do some physical activity, like hiking, to break up my day."

When Ulmer has an idea for a project, he breaks it down into subtasks, which he posts on his personal file at The Source. This file is accessible to UNETIS associates who choose which tasks they would like to work on. The tasks are different for each project since the invention process is different with his project. Upon completion of his particular task, the associate is given credit which is represented as a percentage of the total job. When a job is completed, any profits that are realized from it are distributed by percentages to each participating associate.

The inventions that Ulmer is partly or fully responsible for show the importance he places on using the microprocessor to improve the quality of life. For example, his latest hardware creation is a telephone answering ma-

(continued on page 35)



GREAT NEWS FOR EVERYONE WITH A PERSONAL COMPUTER! A NEW BREED OF PRINTER, PURRRFECTLY PRICED.

High Performance Word and Data Processing For Under $700.

When advertising, TV and film people need a puma to pose or a lion on location, they call the Dawn Animal Agency. Daily, Dawn sends their exotic animals from coast to coast. And they generate a jungle of data in the process. Like so many growing businesses, they need to mate a personal computer to a printer that will keep pace with business demands. But won't take a huge bite from the budget.

Okidata's new multifunction Microline (ML) 92 printer is just the animal. For letters, memos or manuscripts, the advanced ML 92 gives you text printing that's a match for any daisywheel's. It prints graphs, charts and illustrations. Even emphasized and enhanced printing to help you stress a point. As for data processing, this cat doesn't pussyfoot around. Information flies from the 92 at 160 cps. And there's an ML 93, too, that adds wide-column printing to the picture.

Like all Okidata Microline printers, these two new high performers are built strong to keep on running, right down to the print head that's guaranteed for one full year. But the really great news about each is price: $699 suggested retail for the ML 92; $1249 for its big brother. Absolutely purrrfect.

For more great news about the ML 92, 93 and all the Okidata printers, see your computer dealer or call 1-800-OKIDATA. In NJ, 609-235-2600. Okidata, Mt. Laurel, NJ 08054.

OKIDATA

A subsidiary of Oki Electric Industry Company Ltd.

All Okidata printers are compatible with Apple, IBM, Radio Shack, Osborne and just about every other personal computer.

CIRCLE 14

Computerized Marketplace Is Open For Business

Scott Groseclose and Neil Eglash have succeeded in computerizing the old "haggle-and-buy marketplace." The founders of the Computer Home Economic Supply Service (CHESS), which is accessed by customers on The Source, have made the computer into a perfect "mail-order" marketplace for skeptical consumers.

Two years ago, Groseclose and Eglash were looking for ways to combine their talents and start a business of their own. (Groseclose's background is in retailing and Eglash was a computer programmer.) They didn't have much start-up capital, so the choice of business opportunities was limited.

At about that same time, Eglash ordered some household equipment from a mail-order retailer he located through a CompuServe bulletin board announcement. He wasn't satisfied with the service he received; the equipment arrived six weeks after he ordered it. "There seemed to be a void in the marketplace, as far as the availability of goods over the computer was concerned," Groseclose says. So the two decided to try computerized retailing on a full-time basis, and formed CHESS.

To get CHESS rolling, Groseclose and Eglash had to set up an initial distributor network for the equipment they wanted to sell by computer—stereos, small household appliances and, of course, computers. CHESS's total start-up costs were limited to the price of its computer and peripherals, about $49,000, and its Source on-line charges. From there on the costs of running CHESS were minimal. Because of that, Groseclose says, he can beat almost any price a regular retail store offers.

"For starters we have no inventory costs, since our wholesalers (nationwide) are usually willing to ship directly to our customers," he explains. "And considering that inventory financing is still around 20 percent, that savings alone puts us ahead of the game."

Getting customers is no problem either, Groseclose says. He does not have to print catalogs, conduct direct-mail campaigns, or advertise to get customers. "We get all the advertising we need for free, on The Source's various bulletin boards," he says. "And this gives us access to a prime target: young people with average annual incomes of $30,000 to $35,000."

Using The Source provides a great deal of flexibility for CHESS. "A few weeks ago, one of our suppliers wanted to unload some hair dryers, and he was willing to give us a very good price. I put the information on a Source bulletin board, and I sold a good many units in just a few days. This would be impossible for a mail-order house, and very difficult for a retail outlet," Groseclose says. "Also, since we keep careful computer records of who bought what, if we have, for example, a special on printers, we can send individual electronic-mail letters to any customer who bought a computer from us without a printer."

In addition, computer selling allows Groseclose to better manage his manpower needs (CHESS now employs four people) since he can be "open for business" at his own convenience. Messages and orders from customers can be received at any time of the day or night, over The Source, at his Silver Springs, Md. location. He feels that using The Source eliminates problems that many businesses face, of having certain hours when there are not enough employees to take all the orders, and other times when sales people are sitting idle. "Our customers have all the convenience and immediacy of a full-service catalog sales company with a toll-free number," Groseclose says, "but we have none of the problems and expenses associated with that type of operation."

Since most of The Source customers have had a credit check when they originally signed up for their Source accounts, the problem of credit-card fraud in mail-order houses is practically eliminated at CHESS. MasterCard, in fact, has lowered the premium it normally charges mail-order houses (4 percent, according to Groseclose) by 1.5 percent for CHESS.

To use CHESS, a customer first "window shops" for a computer, small appliance, stereo equipment, or the like at local stores or discount houses. He then takes the lowest price quote that he's received and queries CHESS as to its price for the same product. Within 24 hours the customer receives the CHESS quote in his Source mailbox. If the price is right, the customer simply types in an OK, his mailing address, and his credit-card number, and in a few days the product will be at his door. If the price isn't right, the customer lets CHESS know where he found the product for less, and Groseclose will try to lower the price accordingly.

But prices are generally not substantially lowered because, like other businessmen, Groseclose and Eglash are in business to make money. And make money they have. CHESS' first year sales (CHESS has been in operation since January 1982, but it has been in full swing only for the past few months) were $184,000, and Groseclose expects that figure to at least double in 1983.

—Lawrence Stevens

(continued)

There are five good reasons to buy the new HP-86.



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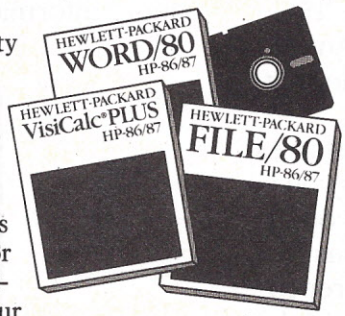
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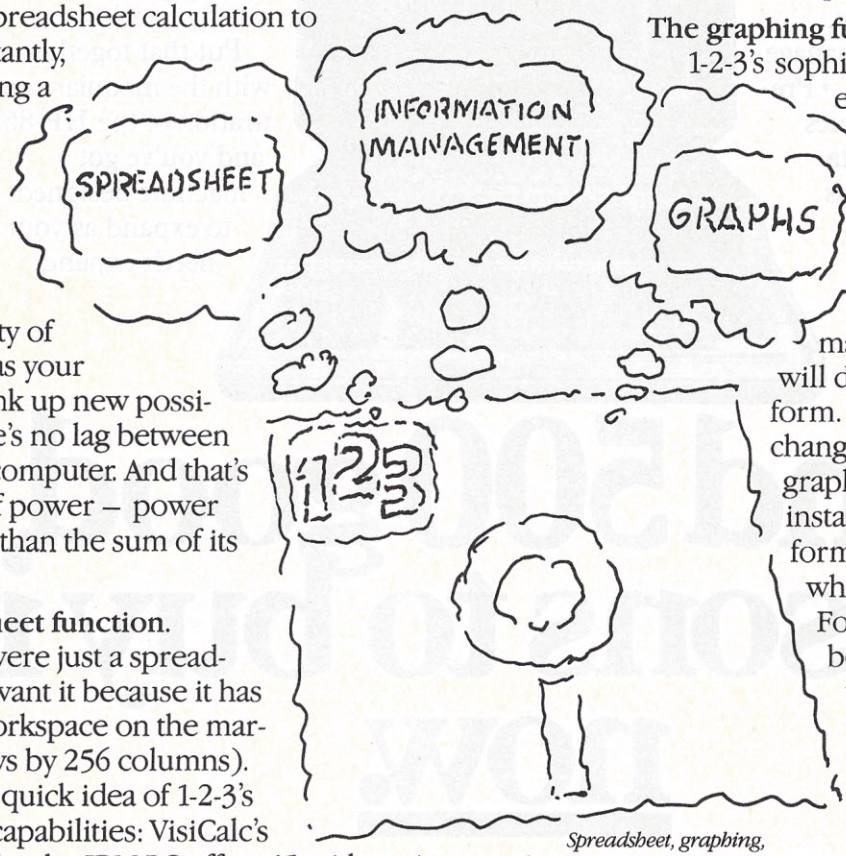
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HEWLETT PACKARD

Meet 1-2-3 – the remarkable new software package that puts more raw power at your fingertips than anything yet created for the IBM PC. 1-2-3 actually combines information management, spreadsheet, and graphing in one program that can perform all three functions interchangeably and instantly at the touch of a key. That's power.

To explain: since 1-2-3's information management, spreadsheet and graphing functions reside in memory simultaneously, you can go from retrieval to spreadsheet calculation to graphing instantly, just by pressing a few keys. So now you can experiment and recalculate and look at data in an endless variety of ways. As fast as your mind can think up new possibilities. There's no lag between you and the computer. And that's a new kind of power – power that's greater than the sum of its programs.



Spreadsheet, graphing, information management all-in-one.

The spreadsheet function.

If 1-2-3 were just a spreadsheet, you'd want it because it has the largest workspace on the market (2048 rows by 256 columns). To give you a quick idea of 1-2-3's spreadsheet capabilities: VisiCalc's spreadsheet for the IBM PC offers 15 arithmetic, logical and relational operators, 28 functions and 32 spreadsheet-related commands. 1-2-3 has 15 operators, 41 functions and 66 commands. And if you include data base and graphing commands, it actually has 110!

In addition, 1-2-3 is up to 50 times as fast as established spreadsheets. With all the features you've ever seen on spreadsheets. 1-2-3 also gives you the capability to develop customized applications (with 26 macro keys) and lets you perform repetitive tasks automatically with one keystroke. If 1-2-3 were just a spreadsheet, it would be a very powerful tool. But it's much, much more.

The information management function.

Add to 1-2-3's spreadsheet a selective information management function, and the power curve rises at an awesome rate. Particularly since 1-2-3's information management capability reads files from other programs such as WordStar, VisiCalc and dBase II. So you can accumulate information on a limitless variety of topics and extract all or pieces of it for instant spreadsheet analysis. Unheard of before. Specific 1-2-3 information management features include sorting with primary and secondary keys. Retrieval using up to 32 criteria. 1-2-3 performs statistical functions such as mean, count, standard deviation and variance. It can produce histograms on part or all of the data base. 1-2-3 also allows for the maintenance of multiple data bases and multiple criteria.

The graphing function.

1-2-3's sophisticated graphing commands enable you to create graphs of up to six variables using information already on the spreadsheet. And have it on screen in less than two seconds! Once you've made a graph, three keystrokes will display it in a different form. If data on the spreadsheet changes, you can display a revised graph with one keystroke. This instant relationship of one format to another opens up a whole new application area. For the first time graphics can be used as a "what if" thinking tool!

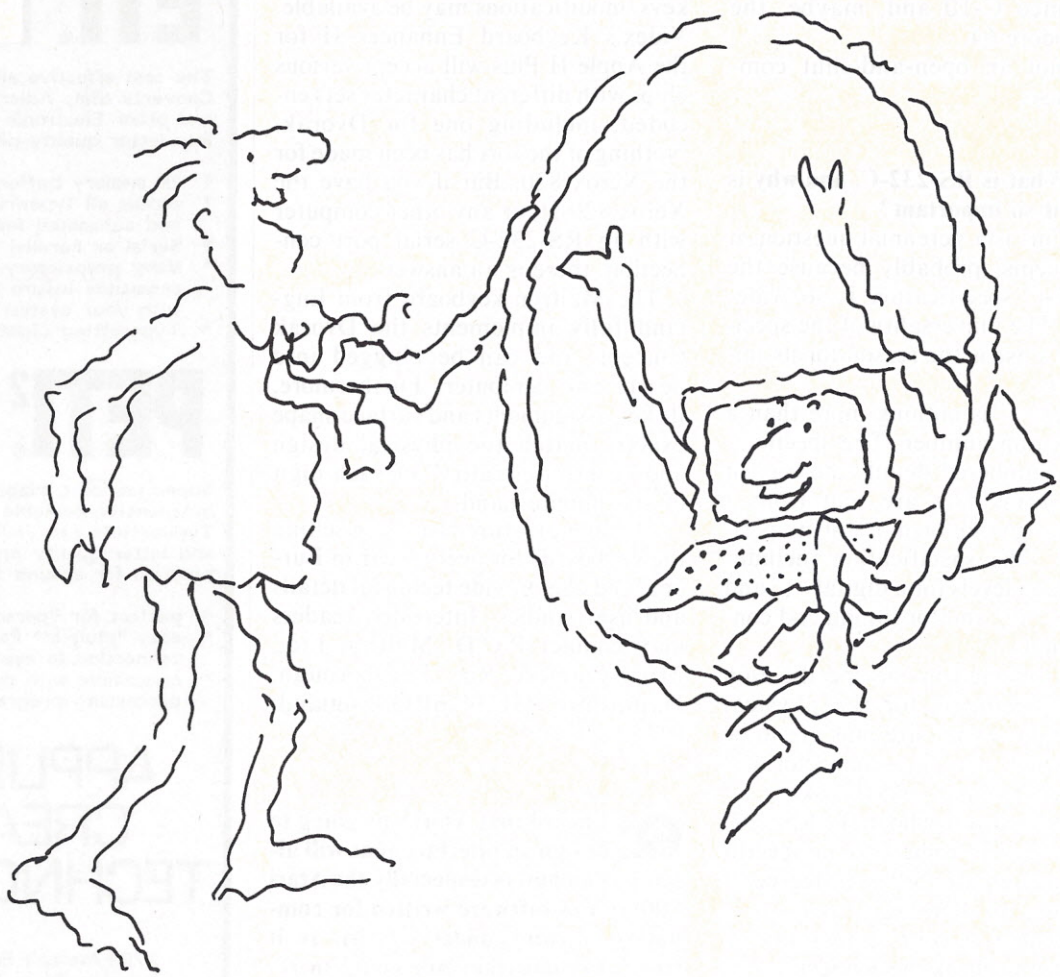
To fully understand just how much power 1-2-3 adds to the personal computer you'll want to go to your nearby 1-2-3 dealer for a full demonstration. For his name and address (and more information if you want it) call 1-800-343-5414.

1-2-3™

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puter now—you'd have to wait a bit.

If the Osborne is to be truly portable, by which we mean that you could use it in a car or boat, then you need to buy an optional power pack—at extra cost.

Now that we've said all that, we have to say again that the Osborne is a good deal if you want the price, the software, and the portability. But there are other computers appearing on the market that out-Osborne the Osborne, like the Kaypro. And if you don't care about the portability, then there are low-cost computers that could do very nicely for you, like the Cromemco C-10 and, maybe, the Commodore 64.

It's not an open-and-shut computer case.

Q: What is RS-232-C, and why is it so important?

A: This is a perennial question, it seems, probably because the RS-232-C specification is so widespread. The universality of the specification's use is the reason for its importance.

RS-232-C is nothing more than a specification number. The specification so numbered details the way in which serial data are sent from a computer to one or more of its peripherals. The specification includes the voltage levels for a digital "1" and a digital "0," and for timing and control signals.

Also included in the specification are requirements for the physical connection—what size pins are to be used, which pins in a connector will carry what signal, and the like.

Manufacturers who make RS-232-C interfaces all comply to the specification to a greater or lesser degree. If you have an RS-232-C port on a peripheral or on your computer, it's a good idea to check the connections on any other device you want to connect to the port, to make sure that all the components are pin-compatible as well as signal-compatible.

Q: I have a Xerox 820 computer that I'd like to convert to a Dvorak keyboard layout. Can I?

A: The conventional keyboard layout—called QWERTY after the key assignments of the top left row—has long been known to hamper rapid typing. The Dvorak layout reassigns key locations so the most-used letters fall under one's fingers on the "home row."

Many computers can be adapted to a Dvorak layout. It's easiest on machines such as the Apple III, with software-definable keyboards. Even on computers with hardware-defined keys, modifications may be available. Videx's Keyboard Enhancer II for the Apple II Plus will accept various chips with different character sets encoded, including one for Dvorak. Nothing of the sort has been made for the Xerox 820. But if you have the Xerox 820-II, or any other computer with an RS-232-C serial port connection, there is an answer.

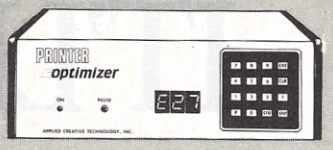
The Maltron keyboard from England fully implements the Dvorak concept, and can be plugged into nearly any computer. Furthermore, its key assignments and surface shape exactly match the physical design and "control circuitry" of each digit of the human hand.

The manufacturer has been selling the keyboards for over a year in Europe, and can provide technical details and user studies. Interested readers may contact P.C.D. Maltron Ltd., 219 Sycamore Rd., Farnborough, Hampshire, GU14 6RQ England; (0252) 46149.

Q: I heard that Atari was going to design an interface that will allow its computers (especially the Atari 800) to run software written for computers working under CP/M. Is it true? (Perhaps they are going to release a new operating system?)

A: Atari is not designing such a system, and has no plans to do so at this time.

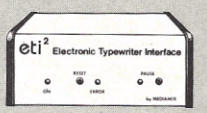
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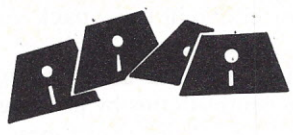
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CIRCLE 16

(continued from page 15)
slower the printer. It's fair to say that if you want reliable letter-quality printing you'll pay a cost and speed penalty.

Ink-jet and laser printers are coming down in price, too. You may see these printers starting to appear at the dealer's with a price tag that doesn't make you gulp. But that won't happen tomorrow.

Business-quality printing probably means what we've heard of as data-processing quality. Dot-matrix printers, which form their characters with a pattern of dots on the paper, give this printing quality. People say business quality isn't good enough for correspondence, but you'd have to be the judge of that. Take a walk to your local computer store and peek at any dot-matrix machine printing in its default mode. That's business-quality printing, and it's pretty good.

Business-quality printing gets better if the printer puts more dots on the paper. More expensive dot-matrix printers have more needles in their printheads. Since the dots are formed by the impact of a print needle with the ribbon, and thence the paper surface, the more needles in the printhead, the more dots. And the more dots, the better the quality of the character.

Those who think they really need something better than business-quality graphics needn't think they must use a letter-quality printer. Correspondence-quality was developed just for them. Correspondence-quality printers use dots to form the letters, but they pack the dots so closely that you can't see where one dot ends and another begins. They accomplish this by printing one character two or three times, advancing the paper a very small amount before each reprinting of the character. This small repositioning makes the dots of the reprinted character merge into the dots of the previously printed character, making the two seem as one, but darker and more solid.

Most dot-matrix printers you'll find have provisions for getting better than business-quality printing. In general, the better the correspondence-quality printing the printer delivers, the more dough you'll deliver to get the printer.

Q: After months of intensive research, I have decided to buy a Commodore 64 or a Texas Instruments 99/4A. But before I make my choice, I must know the answer to this question. Is there a company that manufactures a column expansion device (card or plug-in module) which can expand the TI 99/4A to 40 columns or more? I ask this because no matter which machine I purchase, I need at least 40 columns for word processing.

A: Yes, the TI 99/4A can be made to display and print 40 columns or more—there's no need to buy a special device.

With Texas Instruments's TI-WRITER word-processing software, the video screen physically displays 40 columns at any one time. However, it can simulate an 80-column screen through horizontal scrolling. If you want to enter text across the full 80 columns, what happens is this: As you reach the edge of the screen after the first 40 columns, the display automatically jumps by 20 columns, so what you see are columns 20 through 60. When you reach column 60, the display jumps again by 20 columns, so you see columns 40 through 80. In this way, the last 20 columns of whatever you've typed are always visible. The screen, however, does not display all 80 columns at once.

The number of columns you can print out depends solely on your printer and how you set the output commands. Texas Instruments's TI 99/4 impact printer—TI's version of the popular Epson MX-80 dot-matrix printer—will print up to a full 80 columns.

Q: Is Mattel ever going to provide the keyboard for Intellivision that the company promised?

A: As you may have already heard from George Plimpton on the Mattel television advertisements, the long-promised Intellivision Entertainment Computer System should be arriving in stores in mid-1983.

After test marketing over the past two years, Mattel has come up with a computer keyboard which will plug into the Intellivision Master Component's 16-bit microprocessor. The system will offer built-in BASIC, and a range of software including educational color graphics for kids, three dimensional graphics with music, a new generation of sports games, and the capability for the user to program his own home video games. Retail price is expected to be under $150.

Q: I'm on the verge of buying an Osborne computer. Can you give me five reasons why I should, and five reasons why I shouldn't?

A: Not five, but we can think of a few.

You will want to buy an Osborne computer if you want portability and the software you get for the low price of the machine. The Osborne computer puts these features together at an attractive price. You get a lot for a very small dollar investment.

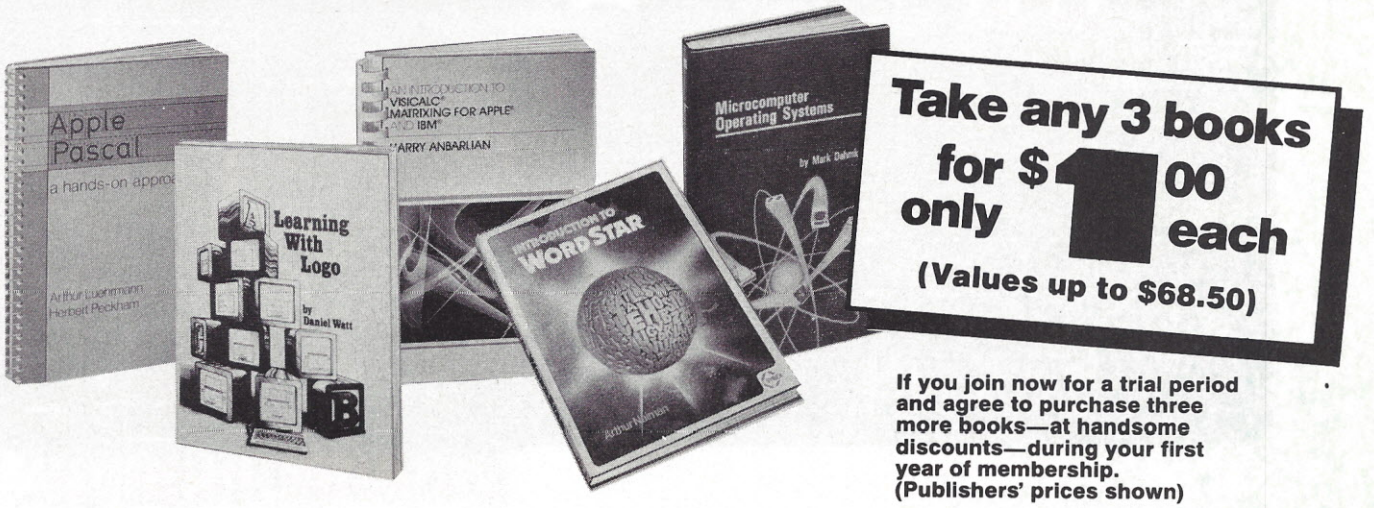
There are always "buts." But remember that the Osborne has a very small monitor. If you want a larger monitor, you can get it, but as an option at extra cost. You probably won't take the monitor with you on a trip, so to get the portability advantage you'll have to give up the larger screen, if you bought that. That's not bad—it's just a little annoying.

Would you like to use computer graphics? CP/M 2.2 doesn't support graphics. A newer version of CP/M does. You probably can't get the newer version on the Osborne com-

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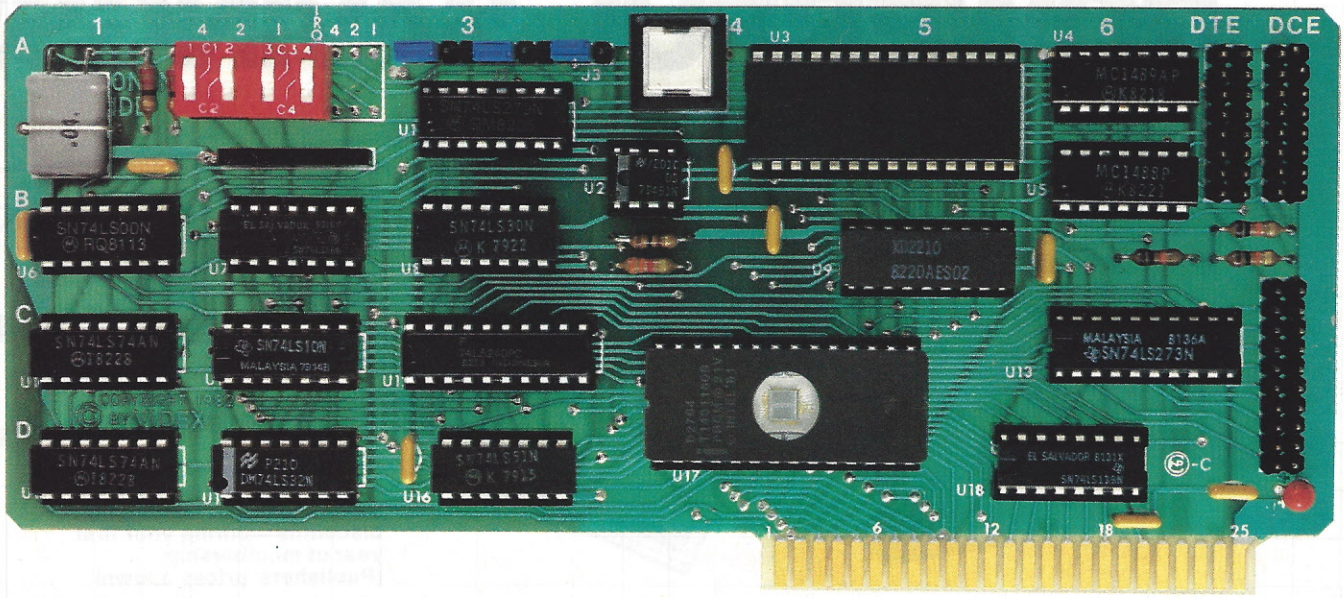
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CIRCLE 13

(continued from page 29)
chine that allows the caller to leave a message; ring the house phones, which sound each time a button on the caller's phone is pressed; and receive a personal message by pressing in his special code. Another invention is a digital tape recorder that has no moving parts and requires no rewinding. He was also involved in inventing a device that prints out musical notes as they are played on an instrument. This machine is designed for rock musicians who have to tune up in noisy auditoriums.

Right now Ulmer and his associates are working on a software project called Structured English Program. This program is designed to make it easier for people to communicate messages or instructions to one another by personal computer. The software simplifies the English language, leaving no question in the receiver's mind as to what the sender's message really says. For example, if one of Ulmer's associates leaves a message for him in his Source mailbox that leads off by saying, "At this point in time . . .," the Structured English Program will change this phrase to say, "Now.."

How does he market his inventions? Well, Ulmer sells his hardware and software to people whose business is distributing hardware and software products. They market his projects and pay him a commission.

As of this writing, UNETIS is just getting started and is still rather informal. "I've had a good amount of interest, and the structure is beginning to fall into place. But we have not as yet worked on a project to completion," he admits.

The informal nature is typical of many "electronic" businesses. The reason is that they have evolved gradually, as people have needs and seek ways to fulfill them. And usually, it's the individual user who has pushed the networks to respond to his needs. For now, like the early frontier, there is plenty of room for the electronic entrepreneur to stake his claim.

—Lawrence Stevens

The Cognitive Revolution On Campus

Beginning in the fall of 1983, Carnegie-Mellon University in Pittsburgh, Pa. will begin installing a network of personal computers on campus—a network that within four years will link several thousand personal computers for faculty, administration, and students. The personal computers will be designed and built by IBM; by 1985 every student in every major will be required to buy one, and they will be able to take the machines with them after graduation.

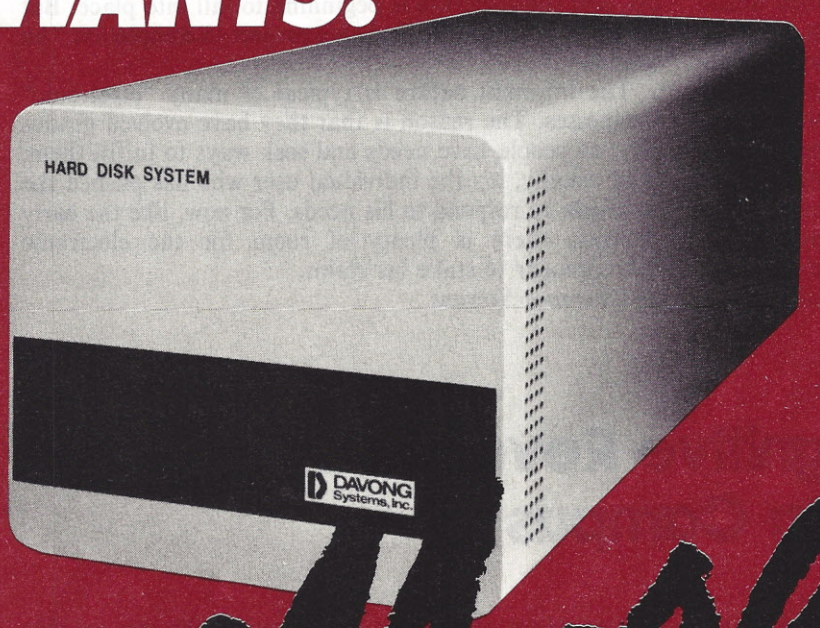
Carnegie-Mellon is not the first campus to announce its intention to go with The Cognitive Revolution. Stevens Institute of Technology in Hoboken, N.J. will also be requiring incoming freshmen to buy Atari 800 personal computers, and Clarkson College of Potsdam, N.Y. is requiring its incoming freshmen to purchase Zenith Z-100 machines.

But what distinguishes Carnegie-Mellon from its predecessors are three factors. First, all students in all disciplines—not just science and technology majors—will be required to get personal computers. Second, the personal computers will not be off-the-shelf machines already available, but will be custom-designed through an agreement between Carnegie-Mellon and IBM. Third, the personal computers will be linked together in a full-fledged communications network, so that users at different machines on campus can interact with one another and with campus data banks. Eventually the network may link Carnegie-Mellon with Pittsburgh's off-campus community and to other campuses around the country through satellite uplinks.

Why is Carnegie-Mellon having its personal computers designed from scratch? Because any new system installed on campus has a tough act to follow—the campus' extensive and sophisticated time-sharing mainframe system, TOPS. Already, through terminals, faculty and students regularly access data banks, post notices on computer bulletin boards, do word processing, and communicate with other terminals via electronic mail—in short, they have far more power at their keyboard fingertips now than any current off-the-shelf personal computer offers. The new personal computers for Carnegie-Mellon have to be designed to do at least as much as TOPS—and preferably, even more.

The design work will take several years. Carnegie-Mellon has just signed a three-year agreement with IBM, in which IBM will develop the hardware. In the meantime, IBM will install about 100 transitional machines based on the Motorola 68000 16-bit microprocesor and a bit-mapped graphic display, in order to learn more about the daily computer needs and applications on the campus.

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Carnegie-Mellon is building an Information Technology Center on campus, to work with IBM developing software for the network of new computers. Through this joint venture, Carnegie-Mellon can specify its needs and wants in a network of personal computers—knowledge that will later stand IBM in excellent stead should it wish to market its expertise elsewhere. By 1991 it is projected that 7500 machines will be linked into the network.

The emphasis of the network will be its accessibility. In the words of the Carnegie-Mellon Task Force for the Future of Computing, headed by Allen Newell: "Access must be easy, reliable, and pleasant—even gracious."

"The students are the ultimate beneficiaries," says Douglas E. Van Houweling, vice provost of computing and planning. "We put a premium on student time. The network of personal computers will allow them to do their work faster, and not have to wait for time on TOPS."

The current time-sharing system can be quite slow during times of peak demand, and has also been known to go out of operation for several hours at a time. Each personal computer, if operated as a stand-alone workstation, would not be subject to such delays. "The network will also give the students computer literacy, which will give them an advantage in the job marketplace after graduation," says Van Houweling. "Also, they will be able to take away with them a machine for $3000 far more powerful than they could hope to buy for anything near the price—which will immediately capitalize them in their work." He also observed that the network of personal computers is a relatively inexpensive way for the university to expand its computing power, because the chief demand on TOPS is for work—such as word processing—that could be done well by much smaller machines. Not to be overlooked, of course, is that if each student takes his machine away after graduation, the Carnegie-Mellon network will always be evolving.

How do the potential users feel about the new network? Generally, faculty members seem favorably disposed.

And what about the principal beneficiaries—the students themselves? Reactions are strongly mixed. Some students are enthusiastic: "There is no discipline that a computer cannot assist," says one student. Some are outright hostile: "I can't see the use for it in my field, and I feel as if it is being shoved down our throats—that we are being guinea pigs," says another. Interestingly, the emotional reactions, pro and con, are not clearly split along the science/humanities division. And most students have serious questions about how high the expense of the personal computer might raise the yearly tuition.

As a technological experiment, Carnegie-Mellon's projected network of personal computers is unparalleled.

But in installing the personal computers, Carnegie-Mellon and its task force are keenly aware that the network is also a social experiment—because it will alter the cultural environment of the campus and the way people will do things. States President Richard M. Cyert, "I expect that this will be looked back upon in 25 or 30 years as the most significant move in the 20th century as far as higher education goes."

In the short term, however, Cyert and others are quite conscious that the university is being turned into something of an experimental electronic marketplace, where the effects of such a system will be studied by psychologists and sociologists. Carnegie-Mellon sociologist Sara Kiesler observes, "No one really knows what the issues are. Will the access to information at all levels exacerbate organizational problems that already exist, such as the debate between centralization and decentralization? And what are the social implications of where you install them? If you put them in each dorm room, will that tend to isolate the students from one another? And if you put them all in a lounge area, what are the practical problems of integrating a new technology in an old architecture—such as air conditioning, and security?"

As in social revolutions of the past, the transitional period of The Cognitive Revolution, on campus at least, has produced feelings of displacement and distress, as well as excitement over the grand vision. Carnegie-Mellon, keenly aware of that, is phasing in the network in a responsible way that is hoped will be natural and least disruptive—so as, in the words of Newell, "not to sacrifice the present for the future."

Keeping Track Of Baby

Renee and Pete Trenholm's house is full of "babies." There are so many "babies" that the Trenholms have had to rent a small warehouse. No, these "babies" are not real, live, crying, gurgling babies—they're dolls. The Trenholms are running a mail-order doll business.

To go along with all these babies the Trenholms had a house full of invoices, sales receipts, letters, shipping receipts, custom forms—paper. Piles of paper. But not anymore. Last August, Renee and Pete purchased an Altos 5-15D personal computer with two disk drives, Televideo

950 and Adds Viewpoint terminals, and a Centronics 739 dot-matrix printer.

Business, which is going great, would be "no go" these days without the computer. "You can't even imagine how much time it saves," says Renee. "Before we got the computer it was really all my husband and I could do to handle the business. Since we've gotten things set up we don't have all the reading and writing, and (we) don't make as many mistakes."

Renee recalls, however, her dismay after first purchasing the system. "I was really upset," she says. "I'd spent all that money and it wouldn't do anything."

The problem? No good programs. But after the purchase of Accounts Receivable & Inventory Processing System, Prospecting System for customer correspondence and mailing, TCS General Ledger System, and Quic-N-Easy application software, all from Compusol in Atlanta, Ga., things began to look better.

"The main thing I'm happy about is that we have instant access to information," says Renee. Previously, when a customer called, requesting information on an order, she would have to sift through 200 forms until she found the right one. Now she just punches the person's name into the computer and there it is.

"It takes a tremendous amount of time to go through all the order forms and find out who owes what and who's a priority," says Renee. "Now the computer tells us everything. It tells us who owes more money, who paid and who hasn't, and who wants pierced ears on the doll and who doesn't."

Renee recalls the woman who called with only one question, "Where's my baby?" After searching through piles of forms a record of payment was found, but not of shipment. "I always had a problem with filing," says Renee. "Somehow everything always manages to end up in the wrong pile—pending orders with the back orders, payments with the shipping receipts." Now that the computer is doing the filing she trusts things to be right.

This trust was not easily acquired. Like most relationships, it developed over time. "You just have to get used to it—do it a number of times," says Renee. "You have to come to trust it."

Like most computer novices, Renee had her moments of total frustration. "It took awhile for me to get comfortable with it so that I didn't want to send it back," says Renee. "It wasn't anything serious—I just couldn't punch everything in and have it go where it was supposed to. The thing that I didn't like about it is that you have to do things the computer's way. I like to do things my way. I'd find myself sitting in front of the computer writing out a mailing label," she says. "At first you have to force yourself to do it the computer's way until it becomes the fast way."

Receipts, shipping forms, and address changes are now all a breeze. "It only takes five seconds to punch that information into the computer," she says. "If you sit down and write it the whole process can take 10 to 15 minutes.

"We had a girl type our mailing list for our spring catalog," says Renee. "It was workable but there were a lot of duplications and a lot of errors. With the computer you're not going to be laced with a lot of duplications. I like the fact that once you get something in there it's spit out correctly. It eliminates human error."

Most of the mannequins and dolls sold by Trenholm Treasures International are shipped from Germany and Spain. The mannequins retail for between $49 and $225, the dolls between $10 and $100. Since most of the mannequins and dolls are shipped from overseas, there are pages and pages of custom forms to fill out every month. About the only information different each time is the date and weight of shipment. Yet previously, each form had to be entirely rewritten, says Renee.

Renee says that having the computer has also helped her keep in contact with the customers. "A lot of people are afraid to do business through the mail," she says. "It's scary dealing with someone you can't see, and many people have had bad experiences with mail ordering. "If you don't have some type of contact with them, about every two weeks, they get edgy."

People call all the time and ask questions about the various dolls and mannequins. All the information is in the catalog if they would just read it, laughs Renee. "And they're perfectly satisfied with that—they just want some contact with the business."

Now Renee wonders how she ever managed without the system. In fact, when we spoke with her, smack in the middle of the Christmas rush, she was eternally grateful to the system. "I would probably have a nervous breakdown, as close to Christmas as it is, without the computer. Everybody since Thanksgiving has been calling up asking 'Will I get my baby before Christmas?'"

"The Christmas stock starts coming in around August until you can barely move by December," says Renee. Last year during Christmas season business more than doubled. "I expected a lull afterwards but it never came." This year business increased again by about 25 percent.

During last year's Christmas rush Renee mailed out almost 150 mannequins a week. "I don't usually ship out that much, and I wouldn't be able to without the computer," she says. "There's no way I could have handled this without the computer. It has become the backbone of the business, even in just the short time since its purchase.

Renee says the business, which represents a good portion of the family's income, is a 24-hour job. But she enjoys being a businesswoman and her husband appreciates the challenge. "His greatest challenge was getting me on the computer," laughs Renee. "It took a lot of support to really get me to stay on it."

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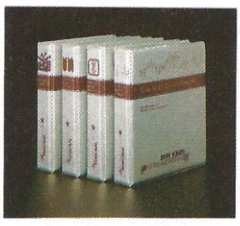
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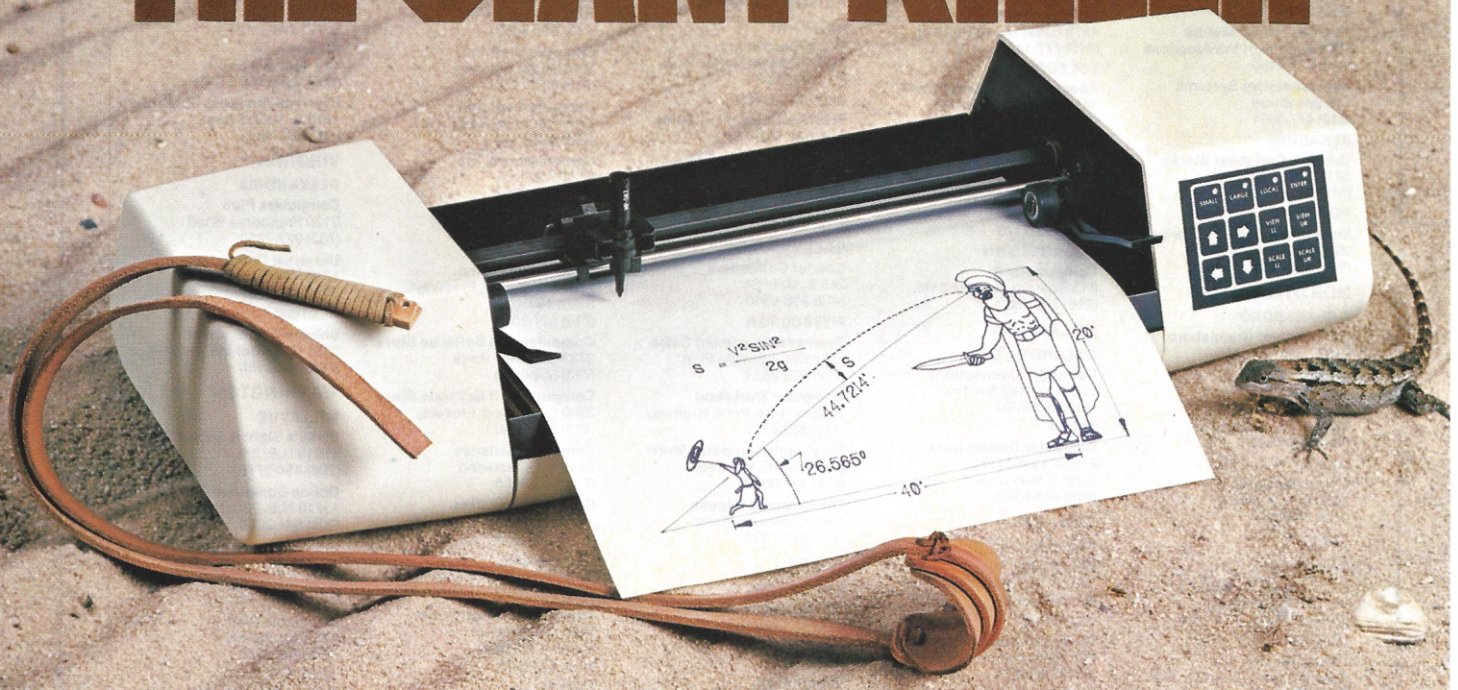
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CIRCLE 28

4P006

Fred Gibbons On Inflated Software Costs And Hardware Incompatibility

The PFS line of software—the filing system and graphics packages from Software Publishing Corp. in Mountain View, Calif.—is consistently atop the best-seller lists. The guiding hand behind PFS, Fred Gibbons, the president of Software Publishing, gives one simple reason: "We are able to deliver software made for a whole variety of users that is (as) simple as a calculator to operate."

Gibbons learned his trade well. He cut his high-technology eyeteeth with two of the most successful and innovative computer firms in the nation. He graduated from the University of Michigan with a BS and MS in computer science, then worked as a reseller of Data General minicomputers. Next, with a brief stop to pick up his marketing MBA from Harvard, he became marketing manager for Hewlett-Packard's 250 and 125 computers, HP's first business-based personal computers.

Gibbons sees the personal computer as an essential tool that can improve the way our society communicates. But he fears that personal-computer manufacturers are beginning to ignore the needs of the industry's prime users in developing new products. His thoughts on these matters—as well as on software prices, the Japanese, and hardware standardization—made for a lively discussion when Personal Computing *caught up with Gibbons in his Mountain View office last fall.*

You are one of the earliest participants in the personal-computing industry. Looking back, what has the personal computer contributed to our society?

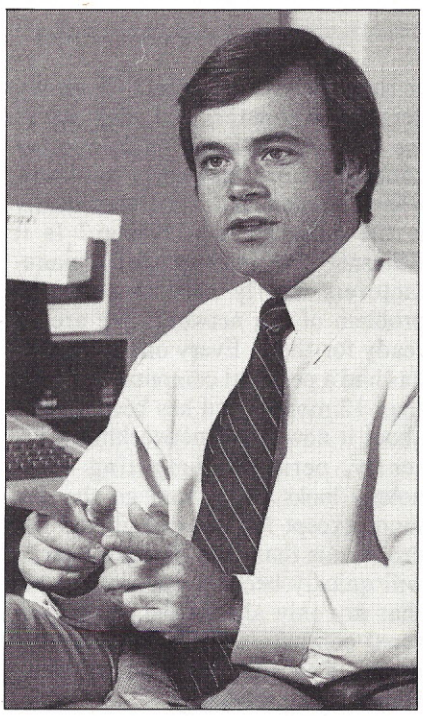
Gibbons: The personal computer is a powerful and important machine for one simple reason: When I am using it, it is an extension of what I think about and the way I express my ideas. It's very much an extension of my ability to communicate. I own it. I can do what I want with it. I use it the way I want to, and I have no obligation to an organization to use the computer and the information I get from it the way the organization wants me to. I have control over it.

Let's look at the other side of the coin. Where has the personal computer failed?

Gibbons: The software is difficult to transport, machines are often too slow, decent computer-to-computer communications are impossible to accomplish, and there are some severe failings in machine design. But today too many manufacturers are ignoring these concerns which they must consider if the computer is to become a better productivity tool.

As a user, I don't need a lot of the new things I'm seeing, such as the zoom-in capability of the new screens, or the mouse that moves the cursor around. Those are nice, but right now what's really needed are fundamental changes, such as detachable keyboards, cordless keyboards, flat panel displays, lighter machines, increased disk capacity, networking capability, and the like. If there was a concentration on basic engineering questions, the personal computer could become more of a tool that I can use in the office—and then take it with me to use wherever I go.

"My fear is that in our desire to make a buck, we may miss the market."



Is there something necessarily wrong with augmenting the power of the microprocessor? Doesn't that also make the computer a better tool?

Gibbons: There may not be anything wrong with that approach, but there is a chance that concentrating only on the microprocessor will blow the whole concept of what a personal computer is. Instead of making the machine more user-friendly by improving transportability, or the keyboard, or its disk capacity, there's a chance that concentrating on the microprocessor means that the stress is simply on making the personal computer into a mini or a mainframe. The personal computer is

successful because it is personal. It is a machine that is very customizable and tailorable, very responsive to the needs of each person, and very flexible to the way he works. If the software people keep their eyes on the ball, they'll end up using the added horsepower on the microprocessor to make their products simpler to operate. They'll end up using the CPU for better graphics and easier data manipulation. But my fear is that in our desire to make a buck and constantly build something new, we may overshoot the center of the market.

Who is the typical personal-computer user today—the person who most manufacturers should be aiming their products at?

Gibbons: The personal computer should be focused at the professional person in a big company. He's at the middle or bottom of the organization, where there is a ratio of 10 of his type to one secretary. And he's so career gung-ho that there's no way he's going to wait two days to get a memo done, or three weeks to get a chart done. He's going to do it himself, at his own desk, with his own two hands. And that's where the personal computer helps him. The guts of the industry is this basic-level professional trying to get his work done faster. So it shouldn't be the upper-level executive who we try to reach. Yes, he needs management pointers. And he needs access to information. But the greatest need for the personal computer is at the professional level—the man trying to get his work out more efficiently.

Our surveys concur with your assessment. The middle-management professional holds the largest market.

Gibbons: That's right, and I'm saying that in our rush to come out with newer and newer technology, let's not ignore his needs.

Is there one specific need that's not being addressed?

Gibbons: Yes. Decent computer-to-computer communications—networking, if you will. One of the major problems facing the typical personal-computer user is that he has to be able to easily access and send data via his machine. One of the questions we should be concentrating on is how we are going to turn personal computers into sophisticated data communicators. That's where the machine is really lacking.

My company is now basically out of gas on personal computers because of their inability to easily share data. Our software tools—PFS and PFS: Report—are slick, easy-to-use, and well-accepted. But I can't find a product that will take me to the next step, where my users will be able to easily communicate with data bases they create with my software. What we know we need is a data-base server that allows me to run PFS on my personal computer, and also allows me to access information from other computers. In general, we know what's needed, but what specifically is the answer? Is it Nestar? Is it Ethernet? Personal-computer manufacturers clearly need to solve the problem of the network. We are all ready for them. Every one of us who has had a personal computer for more than 12 months and has been serious about it now needs networking. Currently, personal-computing technology looks like it can go the distance except for this one glitch. The problem is that, as a business user, it will quickly become apparent to me that my only alternative, if my personal computers can't communicate easily, is to hook into mini or mainframe data processing.

> *"How are we going to turn computers into efficient data communicators?"*

And all of a sudden the nature of your computing has changed.

Gibbons: Yes, it becomes a double-entry problem. Working at my desk I can input and manipulate a whole host of information on my personal computer. Then, when I want to transmit that information throughout my corporation so others in the company can work with it, I have to enter it into my corporate computer, either mini or mainframe.

Why not load PFS directly onto the mini from your personal computer?

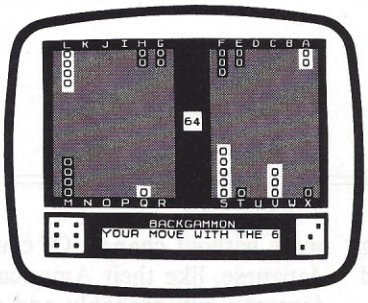
Gibbons: We could go that way, but that brings up another issue. As soon as you buy a personal computer, you have expectations about the machine that you rightfully want fulfilled. One expectation is that it will do what you want it to do without a great investment of more money. When you try to move a program from your personal computer to the mini, you are talking about hiring programmers and other outsiders to reprogram the computer that you bought because it was personal and in your control. This is an important philosophical chasm that is currently too wide to jump across. With networking we could simply communicate directly and not have to shove everything through a mini or mainframe.

The question is, why can't we appreciably grow our data-processing needs on the personal computer, rather than being forced to have a big machine jump in to handle the larger types of data manipulation? In the long term, I'm not concerned. I think the personal-computing industry will solve this problem.

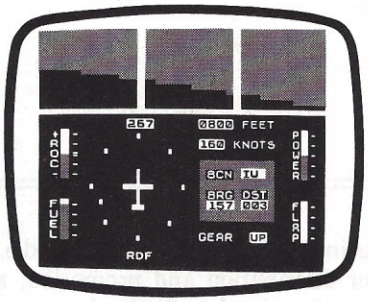
Let's look at the personal-computing market as it currently exists. The number one concern for most consumers is pricing. Many users complain that software prices are too high.

Gibbons: There is only one reason that software prices are high today. It's because the consumer is naive and allows the software manufacturer to

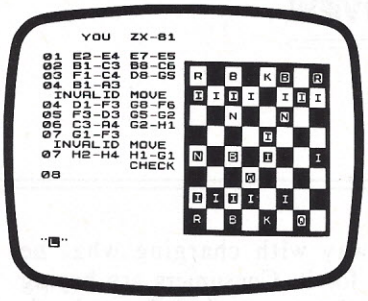
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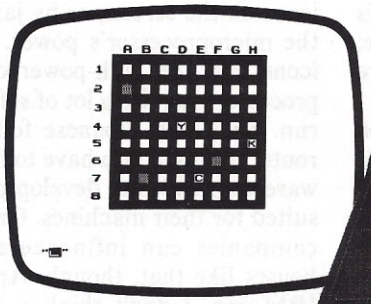
BACKGAMMON



FLIGHT SIMULATOR

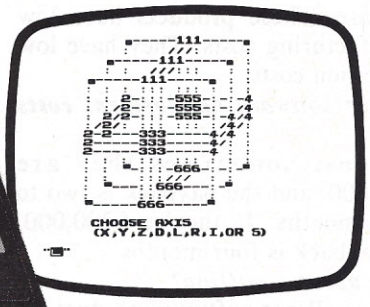


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get away with charging what he wants for it. Consumers are buying under the assumption that price is proportional to quality, and that's not the case. These products have low manufacturing costs. They have low replication costs.

Are the software development costs high?

Gibbons: Sometimes they are $100,000, and the payback is two to three months. If they're $200,000, the payback is four months.

What about a million?

Gibbons: What software product do you know of that costs a million dollars to develop? VisiCalc? No. PFS? They cost $100,000 to $200,000 to develop. Promotional costs might be another $200,000. With those numbers, most software is overpriced. It's just a fact of life.

Indications are, if you look through the ads these days, that the industry is gearing up for a major software price war. And the only thing that will enable certain product manufacturers to keep their prices out of the fight is brand name. You can always charge for VisiCalc—it's a brand name. So for a manufacturer, the aim is to establish a brand name. But the poor consumer really suffers from this. There is one factor, though, that does keep prices up for the manufacturer. We have to constantly reinvent our software packages for each computer. The point is that the consumer is paying through the nose each time we have to spend labor and development dollars reinventing our product. If there was some sort of standardization of hardware, the consumer would benefit enormously. You'd see our prices go to half or a quarter of what they are if we could make them once, so they would work on all machines.

Considering your position on software prices, can we expect that Software Publishing will continue to drive prices down?

Gibbons: Absolutely. What we are trying to do is strike reasonable profits in this industry. We do spend a lot for distribution and promotion, and yes, there is a lot of value in our product. But basically, software is low-priced stuff. Software Publishing is selling its software in high volume; we want to mass market it, and we want to make software affordable.

Are you going to continue to focus on the 8-bit product, or follow the industry into the 16-bit machine?

Gibbons: We can't help but be technology-dependent. If 8-bit machines are the ones that seem to be the choice of the mass market because they track a better price curve than 16-bitters, the answer is yes. But if we see a machine that sells 10 to 20 thousand a month, we will follow it whether it is 8- or 16-bit.

> *"The consumer is naive and allows software makers to charge what they want."*

Let's touch on a sensitive nerve in the personal-computing industry—the Japanese. Do you see them as the enemy?

Gibbons: I'm ambivalent. Do you own a Toyota or a Honda?

No, Mitsubishi.

Gibbons: Do you like your car?

Yes.

Gibbons: Do you feel they made a contribution to your concept of what an automobile needs to be?

Yes.

Gibbons: OK, let's not deny ourselves a good product, wherever it comes from. Laissez-faire. If I were Japanese, I would develop IBM plug-compatible hardware. That's what I'd do to solve the software problem that people claim they have. All they would have to be sure about is that their machines can run the IBM software without change. Of course, the Japanese, like their American counterparts, will probably add value to their computers by putting more icons on the screen, or by jazzing up the microprocessor's power. But the icons and the high-powered microprocessors require a lot of software to run. So if the Japanese follow that route, they will also have to find software companies to develop packages suited for their machines. Only a few companies can influence software houses like that, though. Apple can. IBM can. I don't think a Japanese company can. Considering the innovations that the Japanese have brought to other consumer electronics products, I would like to see them contribute to the design of computer hardware by making it lighter, adding cordless keyboards, beefing up disk capacities, etc.

Do you see many new IBM compatible computers coming off the assembly lines in the near future?

Gibbons: Without a doubt. There's a huge market for them right now. There are a lot of computer stores that aren't carrying IBM Personal Computers for one reason or another. And these retailers would love to have another computer on the shelves that they could sell to customers by saying, "This is just as good as the IBM. It runs all its software. It hooks into all its peripherals. And it's cheaper."

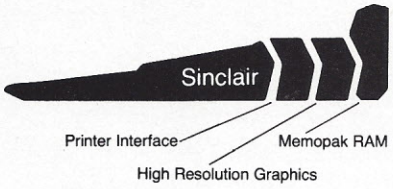
If you were asked to give a keynote address to all the computer and software manufacturers in the world, what would you tell them?

Gibbons: I would say we have to standardize the hardware so that all computers are equipped to run every piece of software. If we standardize hardware, the manufacturers could stop wasting their time developing computers that are different merely because they are incompatible. Instead, manufacturers could concentrate their energies on making their machines more personal, more user-friendly, better communicators.



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PERSONAL COMPUTING

Don't Wait

A hard look at the reasons why people wait to buy personal computers shows that there's really no reason at all

by Michael Rogers, Senior Editor

"Should I wait to buy a personal computer?"

The question is common. The choice it represents is anything but common. The matter of whether to purchase a computer now, rather than waiting for some magical moment in the future is fundamentally different than any other consumer buying decision. It's altogether unlike choosing whether or not to buy a trash compactor or videodisk player this year or next—because a personal computer represents far more than just another appliance.

A computer represents two important additions to one's life. The first is the gift of education—of opting for an active role in the rapidly changing technology in both the workplace and the home. And second, on a more personal level, the computer offers the gift of something that money cannot usually purchase: additional time for living.

In short, the simple answer to that common question is "No, don't wait." But why not?

The personal computer is changing society—finding its way into every facet of life—far faster than anyone would have guessed even five years ago. Specifically, it's altering the job marketplace in a very real way. In the near future, computing literacy will be as necessary a requirement for many jobs as a college degree is now. The difference is that computer experience is available virtually at your corner store. All it takes is the machine and a bit of time.

Reading books and magazines may be a good beginning. Taking a class at the local community college, or in the back room of a nearby computer shop, is fine. But there is no substitute for the actual experience of using a computer daily. It is a tool of such power and flexibility that it's necessary to live with it—to learn not only in a tutorial sense, but by contact and osmosis. Beginning this process needn't cost a great deal. Most computers are expandable—you can start simply, with enough equipment already on board to keep you thoroughly absorbed for months. Later, as experience and needs dictate, you can upgrade with additional components.

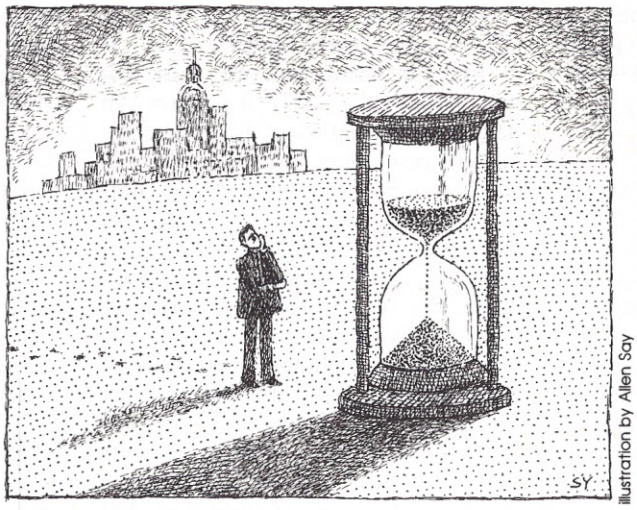


Illustration by Allen Say

Besides educating yourself, there is the problem of making sure your kids won't be left behind, either in school or later in the marketplace, because they missed a vital part of the educational experience. School districts across the country have realized that computing literacy is a critical part of education—and that it's literally never too early to start learning to use this tool. Despite this realization, however, there's simply not going to be enough hardware and software to go around for some time. Kids who get early hands-on computer experience are going to be at an educational advantage—for the forseeable future—and the best way to make sure they have that experience is to provide it at home.

Entrepreneurs in Silicon Valley like to talk about "windows" of opportunity—i.e., the window for getting a foothold in some emerging part of the industry is five months wide, or a year, or two years. There's certainly no end to the window of getting involved with personal computing. It's infinitely wide because the small computer is here to stay, and sooner or later you'll have one (or more) in your life. But there's probably a premium time to start learning about computing—a time to get just a bit ahead of the pack. And that time is now.

Even though it seems as if computers are discussed constantly, at every turn, by every second person, the fact is that the ranks of people in personal computing are still a small percentage of the population. It's a margin-

ally exclusive club, with a somewhat specialized language, a mutual set of concerns, a type of thinking, which does in fact distinguish computing people from their fellows. It's neither mysterious nor difficult, once you get started, but it is a pursuit that attracts individuals with the spirit of curiosity and adventure—and that makes for some fairly interesting company.

The gift of time

An acquaintance recently made the following proposition to a friend, who was wavering over the purchase of a personal computer: "Look at it this way. Suppose I said that if you wrote me a check for $3000, I'd give you six months of free time over the next five years."

The offer may not be applicable across the board, but it does reflect a fundamental reason for not waiting to take the plunge into computing. No matter what reasons you may have for waiting—and we'll get to those in a moment—they tend to pale when compared with the gift of extra time.

Take running a household, for example, which is akin to running a small business. One recent computer buyer found that the two days of household bookkeeping he once did manually every month has been reduced by his computer to a matter of a few hours. The difference between the time it used to take, and the time it now takes, is pure gravy.

You may not buy your computer for household reasons. Your primary purpose may be spreadsheet analysis, or word processing. But almost without exception, once a person has the machine, it is only a matter of time before he finds other applications—household budget, inventory, appointment scheduling, tax records, filing—the list of applications is virtually endless. Each will save a bit of time and render life a little more convenient.

This isn't to say you'll turn your house and life into a rigid assembly line; there's a difference between effective organization and obsessive regimentation. But the result will be extra time to spend precisely as you'd like—on your family, relationships, cultural events, hobbies, whatever. You may even spend some of that time being entertained by your computer. And before you say that you're really not interested in video games, take a look at some of the highly sophisticated entertainment software now emerging for the personal computer. The benefits to be derived are so wide-ranging as to make them subjects for doctoral dissertations.

So why, given all of the above, would anyone want to wait to buy a personal computer? The reasons most often heard seem to be: that prices will go down, that the technology will significantly improve, and that computers will get much easier to use.

Let's take those one at a time. What about prices coming down? It is true that some computers are less expensive than their forebears. In fact, considering what the same computing power would have cost a decade ago, any current personal computer is an incredible bargain. But potential buyers shouldn't be dissuaded by expectations that the computer market will follow the path of, say, the pocket-calculator business. The incredible plunge in the price of simple calculators reflected a saying in the electronics industry: "The first chip off the assembly line costs $500,000; the second one costs a nickel." That's an exaggeration, but it contains an element of truth. For simple integrated circuits design costs are high, but actual manufacturing costs can be quite low once mass production begins. That's what happened in the pocket-calculator and digital-watch markets.

But consumers won't see the same kind of price drop reflected in the most remarkable fruit of the integrated circuit, the personal computer, because a computer is a lot more than a chip. The keyboard, CRT, and associated components add considerable cost. In addition, labor-intensive, high-precision electromechanical peripherals, like disk drives and printers, have a limited amount of production cost that can be shaved. Past that, certain elements—some software, for example—have actually gone up in price over the past few years. The truth of the matter is that rather than radically lower prices, we're likely to see somewhat lower prices, with improved performance, in the years just ahead.

Penny-wise or pound foolish?

But here's the catch: Even if prices do fall a bit over the coming years, waiting to cash in on those relatively small dollar rewards is poor. In strictly business terms, waiting a year to save a few extra dollars makes little sense when the computer itself is almost certain to save you far more money in the same period of time. The question backs down to a simple cost/benefit analysis. If the benefit you expect to derive is money saved, through efficiency and higher productivity, then waiting will most certainly end up costing you dollars. And the less tangible benefits of computing—free time, education, family enrichment—are quantities with price tags much higher than the total dollars you think you could save by doing without a computer.

Does it do what you need?

The second rationale for waiting is no more valid than the first. Waiting for the technology to improve? Then you'll be waiting a very long time, for there is always going to be something a bit better around the corner. In the evolution of a device as complex as a computer, there's never going to be a turning point—a moment at which one can say, "Now it's perfect. I'll take one."

The real question to ask is: Does the machine do what you need at this

The real question to ask is: Does the machine do what you need at this point? In virtually every case, the answer is always yes.

point? The evolution of the computer has been so rapid that the answer, in virtually every case, is already an unqualified yes.

A case in point recently occurred in a California office, where an editor knew full well that an enhanced version of one machine was about to be introduced—but went ahead without hesitation and bought the model for his home. He knew that it filled the bill for his needs, and saw no reason to waste even a few weeks waiting for an improved version. Now, while he thinks the newer, enhanced version is a fine computer, he has no regrets about his decision.

Obsolescence, in short, is an issue that must be carefully considered. What, for example, does obsolescence really mean? Does it mean that the particular version is suddenly so outdated that it becomes useless? Or does obsolescence really mean that a dedicated public relations man is desperately reaching for new ways to convince people to buy this year's version?

If the computer does what you want it to do when you buy it, and will continue to do what you want it to do for the foreseeable future, then that's sufficient technology for the application. The machine isn't going to stop doing word processing or spreadsheet analysis simply because a computer with, say, a slightly faster disk drive comes out the following year. Indeed, sometimes one finds that the people with the flashiest and most up-to-date hardware aren't doing as much with their machines as those with older computers. The reason has nothing to do with technology. It's because the latter group has had more time to learn to use their computer to the fullest—another excellent reason not to wait.

There is one additional—and important—reason not to wait for the absolutely newest and shiniest model to roll off the assembly line: the availability of software. With a brand new machine, you may indeed get the benefit of some extra technologic filip—but you won't always have the huge existing software base that has emerged around more established models. And past that, even if the farsighted manufacturers have allowed for software compatibility with older machines, there is the whole question of peripheral availability. The longer the machine has been on the market, the larger the selection of peripherals will be, both from the original manufacturer and other suppliers as well.

Perhaps the best way to sum up the obsolescence question is to look at the automobile industry. Anyone who has an automobile now, and plans to trade it in, isn't about to wait an extra year or two simply so he can buy a model with an improved fuel injection system. Everyone knows, of course, as long-time automobile consumers, that over the course of the years cars will undoubtedly improve technically. But it simply doesn't make sense to wait—the automobile is a crucial part of most people's lives.

That leads directly to the third reservation that potential buyers often harbor: Will computers get easier to use? The answer is that they already have. The new generation of "friendly" computers is now in the stores. Past that, however, this concern reflects a different, underlying worry. What many buyers are really wondering is not whether computers will get easier to use, but whether they'll be able to figure out how to use them.

A friend, indeed

The answer to that—as already demonstrated several million times across the country—is yes. Learning to use a computer requires a bit of time and that first, crucial step: Buy one and sit down in front of it. A computer is as easy to use as your own proficiency allows. And perhaps the most striking phenomenon surrounding the spread of computers is just how easily a broad spectrum of individuals has taken to the machine.

Once a person becomes comfortable with his computer, the question of "easy to use" becomes superfluous. Indeed, some computer owners actually resist moving to easier machines or software, once they've mastered what they already own. Partly it's familiarity. Some will argue that when a computer is made excessively easy to use, some of its flexibility diminishes—the user loses some of his control over the device. Be that as it may, the sooner one begins computing, the sooner he'll have a truly easy-to-use computer—a machine he knows how to operate as second nature. After that, it makes little difference how future machines change—except that the sooner one begins, the richer will be one's appreciation of the continuing evolution of the computer.

Cost vs. benefits

Earlier, cost/benefit analysis was mentioned in a business context. But in fact, that kind of analysis applies to the general question of waiting to buy a computer. What computers offer the individual—an active role in the technology that is reshaping the American landscape, and additional time through increased efficiency and productivity—are benefits so profound that it's impossible to find worthwhile reasons for waiting.

Not only do those reasons fail to stand up to scrutiny, but they simply aren't significant, contrasted with the powerful benefits available to the individual who begins computing now. Once one owns a computer, the machine soon becomes second nature, and new applications flow naturally. Its very availability spawns fresh ideas about how to use it. Within a matter of months, the computer is so thoroughly woven into the fabric of the owner's life that he can't imagine getting along without it.

And, very often, another thing owners can't imagine is why they waited so long to start computing in the first place.

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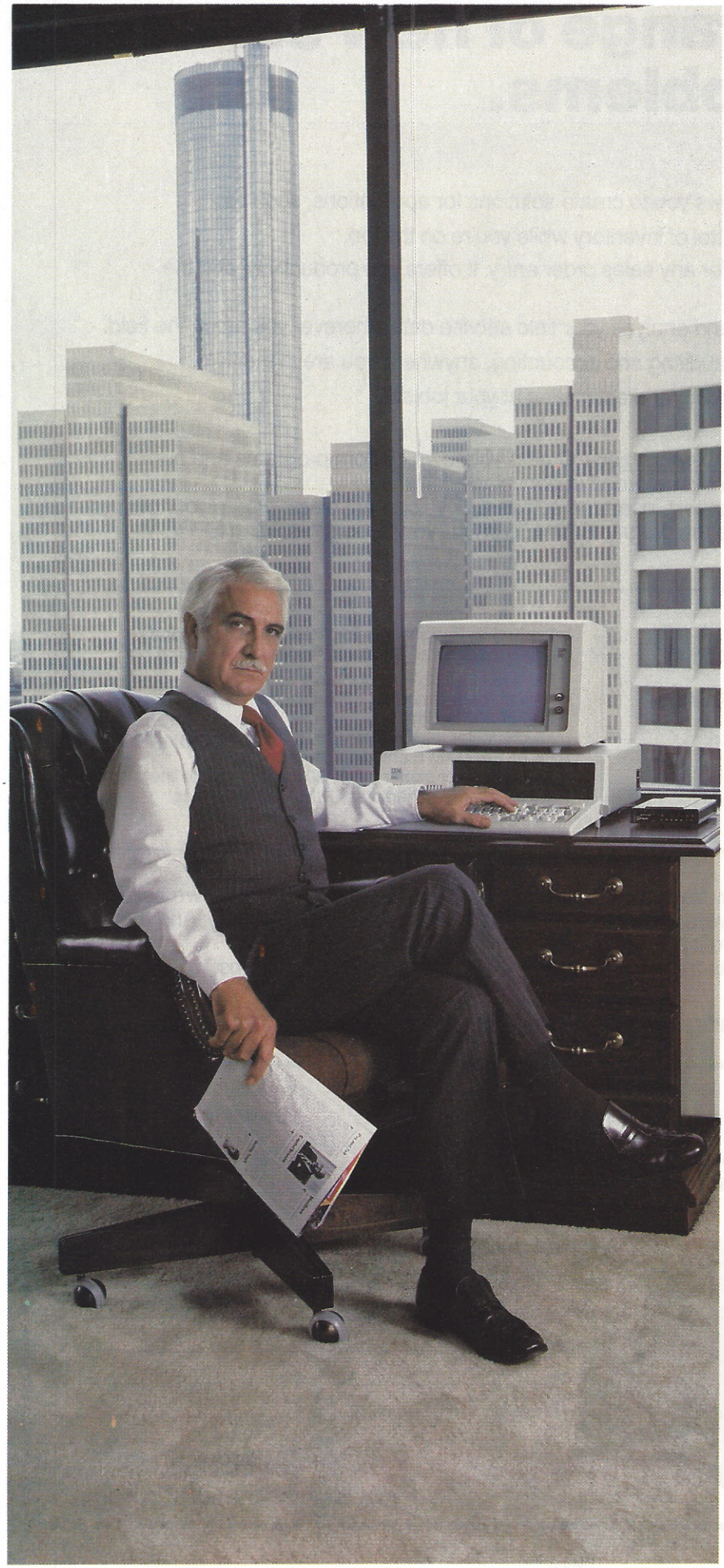
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CIRCLE 18

ADVANCED

How A Computer Can Control Your Home

Smart houses are possible right now, and making them smart is not as hard as you might think

by David Gabel, Senior Editor

Doug Mosher is a self-confessed tinkerer. He fondly remembers that it all started during his teens when the Portland, Oregon city fathers decreed that all pinball machines in town were to be scrapped. He got his influential dad to pull strings and thus saved the machines—he needed their parts to build all sorts of remote-control gadgets. Now, years later, he's using a Radio Shack Color Computer to control his home in San Francisco.

"I saw an ad for the Radio Shack Color Computer at about $400," he says. "I rushed out and bought the thing. Actually, I had delayed getting a personal computer too long, considering the way I like to fool around with machines."

Mosher was already into home control. "I had fooled around for about three years with other methods of home control," he says. "At one point, I was using the Night Sentry, which operates on the idea of using the very small amount of power—called trickle power—that runs through a light when it's off to control a switch. I also had mechanical timers. I eventually had a whole house full of them, but I got to the point where I hated the things. They're limited in their timing accuracy. Usually they can't be set more accurately than the nearest 15 minutes. They all tend to get a rumbling noise in them after about eight months of operation. But their biggest problem is the headache they cause when the power goes off. You have to run around and reset all of them. It used to take me a couple of hours just resetting my timers after a power outage."

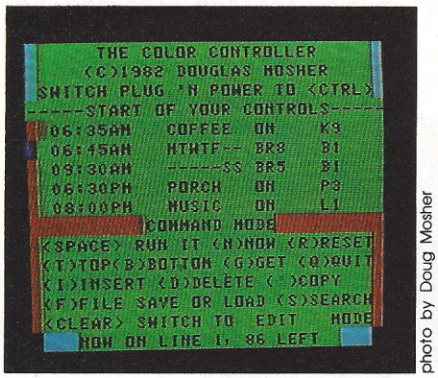


photo by Doug Mosher

Doug Mosher wrote his own program for controlling his home that runs on his TRS-80 Color Computer.

The Radio Shack Color Computer changed all that. Mosher can now centralize control of all the functions he wants to have at his fingertips—and he can control more of them with his computer than he was able to automate with the separate mechanical timers.

"I'm interested in home control for a number of reasons," he reports. "I want to be my own master of the castle. Having domestic servants has gone a little bit out of style these days. It just isn't the thing to do. But the computer can be your servant, and it's OK. Then, too, I'm living alone right now, and the house can be a pretty dull place. Having the lights on when I come home makes it a little friendlier. That's becoming more common these days, too. It used to be that there was a housewife in every home, but I recently saw a survey that said that something like 40 percent of all San Francisco homes were inhabited by single persons. I turn on my lights to make the house friendlier, but that gives me other benefits, too."

Security is a concern

Mosher is quick to point up other, less openly discussed benefits that come from a computer-equipped house. "The area I live in doesn't have a lot of supportive neighbors, so there's a security aspect." he says. He can program lights and appliances to go on and off in such a way that, from the outside at least, it looks as if someone is home and moving from room to room. While that won't deter every would-be burglar, it stops enough of them to make it a significant deterrent against punks, drunks, and skunks.

After Mosher bought his Color Computer, he says, "I got sidetracked by playing. I was like a kid with a new toy. But the computer had so many capabilities, and I had enough background that I was able to get up to speed fast."

Mosher dug out his tools and went to work. He bought a device from his Radio Shack store called Plug 'n Power, which acts as an interface between the Color Computer and a

BSR home-control console. "I couldn't believe it," he says. "There was a 256-channel controller that was selling for $40."

Mosher added BSR modules which are switches that plug into the house wiring and receive signals from the central controller over the electrical circuits. There are lamp modules, designed to handle the relatively low power consumption of household lighting devices. Appliance modules take care of heavier power consumers like the ever-present coffee pot. Wall modules replace wall switches and will turn overhead lights on and off. Each module has a two-digit address. One digit is the house code while the other is the device code, and each digit can have 16 different values. That's how the Plug 'n Power controller gets 256 channels. It can signal each of the 16 different house codes and each of the 16 different device codes. Square 16 and you get 256.

"I just replaced every light switch in the place," Mosher says. "That's some kind of a kingly luxury. I've got remote-control boxes everywhere."

Here comes the sun

Mosher decided to do sunrises. "I get up right now at about 9:30," he says. "So starting at about 9:00 o'clock the computer gradually begins turning up side lights in the bedroom. Then it moves to the overhead lights. By 9:30 all the lights are up, and I'm awake. I thought this would be a better way to get up and go to sleep, so I rigged it to operate in reverse, at night. It's pretty easy to do. You start with a part of a control program that will turn the lights down or up every few minutes by signalling dimmers. Then you decide when you want to get up, and when you want the lights to be fully out. Everything else is displaced from those times."

Making sense of the soil

"I'm an amateur gardener," Mosher says, "and San Francisco has some unusual conditions for gardening.

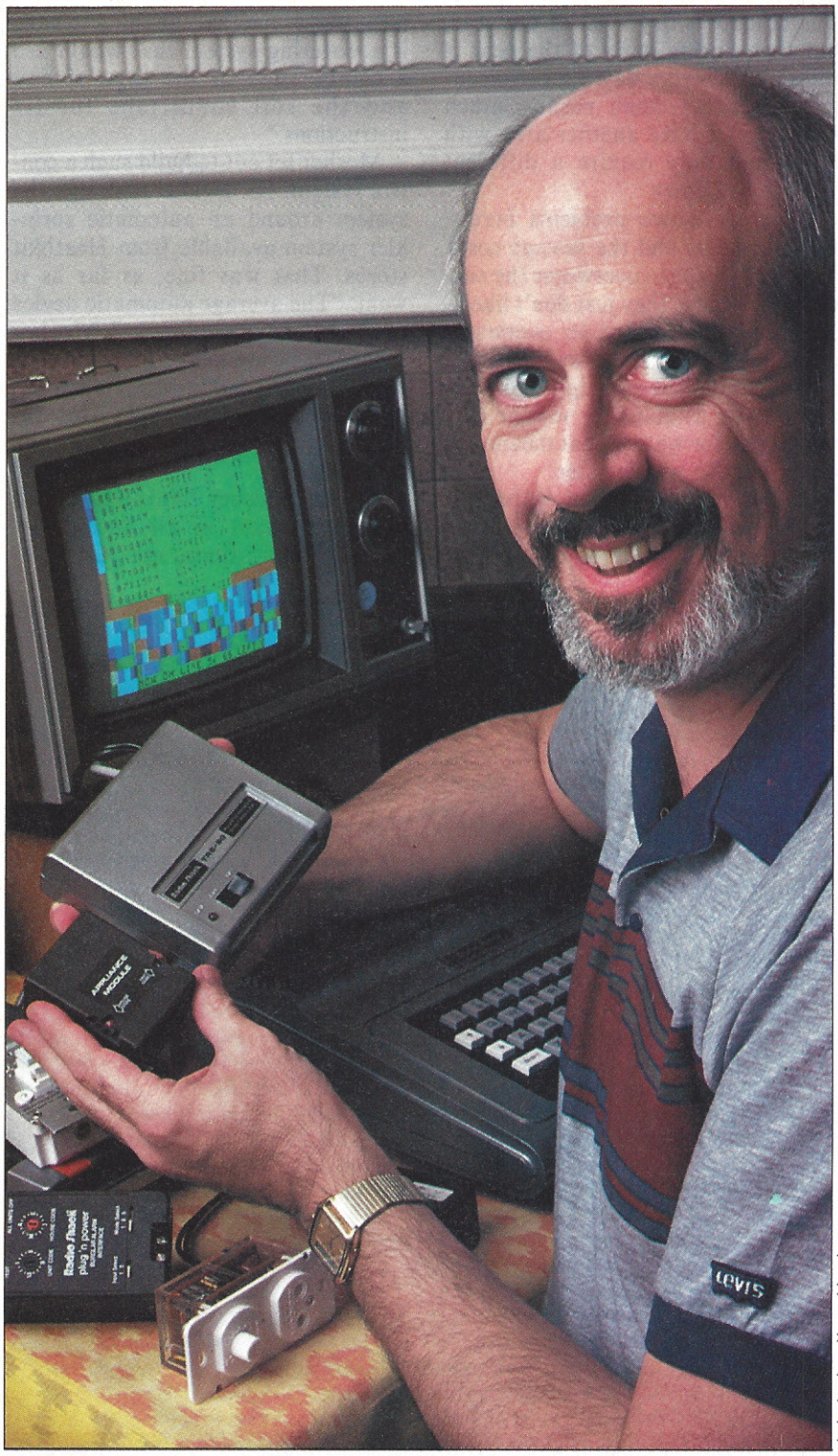


photo by Lee Youngblood

Mosher built his home-control system around the Plug 'n Power controller, a 256-channel device for controlling BSR modules, available from Radio Shack.

The climate is dry most of the year, but then during parts of the year it rains almost every day. I grow succulents and they don't require much water, but I have another area with bulbs and they require a different watering regimen.

"There are two problems here—the succulents and the sewage costs. You don't want to overwater the succulents because they just don't like it. And you don't want to overwater anything because the sewage charges in San Francisco are high. You pay about twice as much for sewage here as you pay for water. That means you don't want to waste water.

"Now you could just water the plants by hand," Mosher continues, "but I always forget to do that. So it seemed to me that the thing to have is a watering system that would use a combination of the time of day and the soil conditions for its instructions."

Mosher set out to build such a control system. He decided to design the system around an automatic sprinkler system available from Heathkit stores. That was fine, as far as it went. "The average automatic device just isn't smart enough," Mosher says. "There are lots of things to consider, even beyond the question of soil moisture. What happens, for instance, if the system fails? How will it fail?"

In fact, Mosher thinks fail-safe is very important in all automatic-control applications, not just roof-garden watering. There was one time when his system provided graphic proof of the need for a fail-safe system.

Before he got the computer working on the irrigation project, Mosher reports, he was using only the sprinklers for automatic, timed watering. He went away for a week, and while he was gone, the system responded to the imperatives of Murphy's law. A neighbor was walking his dog past Mosher's house, and saw water cascading over the roof. Neighbors being what they are, he did nothing except tell the corner grocer that something was funny at the Mosher home. The grocer knew that Mosher was away so he called the fire department. The firemen got in and turned off the water, which saved a lot of potential damage—but there was a catch. The plants didn't get watered. Now Mosher has rigged his computer so that in the event of a problem it won't send the "on" command to the BSR controller that handles the sprinkler.

Mosher had to solve an interesting problem to set up his watering system—he had to determine the moisture in the soil. He discovered he could do that by using the joystick port on Radio Shack Color Computer. "The ports respond to a 0 to 5V signal on four different channels," Mosher explains. "You can read the condition of the channels from a BASIC program. I made a kind of a resistance bridge that connects to the sense position of the port. One leg of the bridge is a fixed resistor, and the other leg is a pair of wires stuck in the soil."

If the soil is very dry, the resistance between the sensing points in the soil is very high. With the circuit Mosher constructed, a very high resistance on the top half of the bridge gives a reading of 0V at the joystick port and the program is written to interpret that 0V reading to mean no water in the soil. On the other hand, when the soil is wet there will be a lower resistance between the probes, and the resulting

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"One leg of the bridge is a fixed resistor, and the other leg is a pair of wires stuck in the soil."

current flow raises the voltage at the sense input. A 5V reading is translated to a digital byte read at the game port of 00111111, or decimal 63. The program interprets a reading of 63 to mean the soil is wet and needs no water.

The sensors have to be calibrated between the end points so the program tells the machine what to do if the sense byte is, say, 20. Mosher used an electrolytic meter to measure absolute soil moisture, and he's still experimenting with different rules to convert the digital values to water-on and water-off conditions.

It's great to calibrate

Calibration is necessary for any kind of sensor application. One of the things Mosher does is have his computer monitor two indoor and outdoor temperatures. He plans to use these temperatures, and others, to control the heating system in his house. "That's going to require the installation of a lot of sensors and dampers in the heating system," he says. "This house has never been properly balanced. Some rooms are too hot and some are too cool. And the situation changes depending on whether it's warm or cool outside. I'll multiplex lots of temperature signals onto one temperature line, which will be read at the game port, using a special circuit I designed that uses only resistors and switches for the multiplexing function. Using those temperature inputs, I'll open dampers in the rooms that are too cool and close them in the rooms that are too hot."

Before he could make the computer sense temperature reliably, Mosher had to calibrate the thermistors, devices that change resistance with temperature.

Calibrated thermistors cost more than uncalibrated ones, so Mosher got the cheaper variety. They cost about 60 cents, he says. "I put the thermistors in Baggies," he says, "so they would stay dry. I had already purchased the most accurate ther-

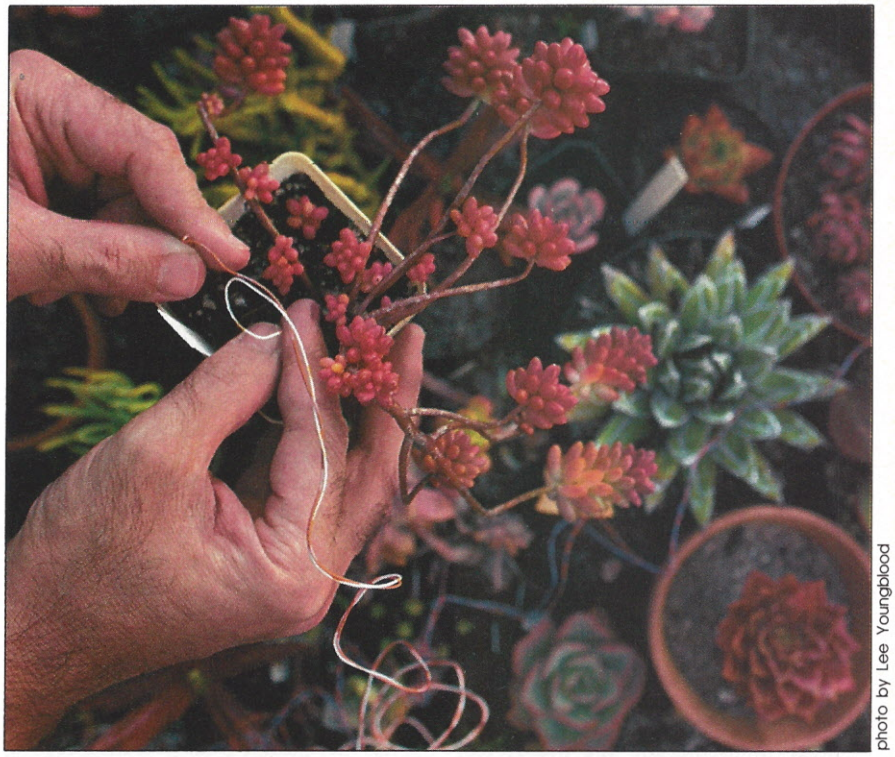
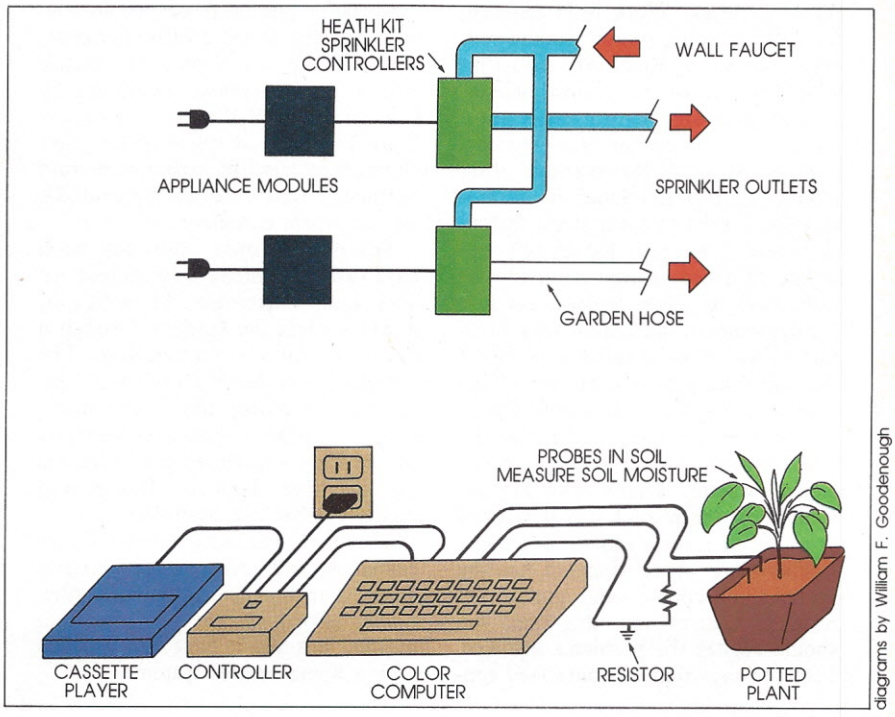


photo by Lee Youngblood

Wires inserted into the soil (top) are used in conjuction with a resistance bridge, BSR controllers, automatic sprinklers, and the Color Computer to tell if the plants need water. Mosher used capacitors to short out AC hum induced in the sensor leads.



diagrams by William F. Goodenough

BUT WHAT CAN I DO?

After reading about what Doug Mosher and Tom Jefferson did to control their homes with their personal computers, many people might be tempted to rush out and get right into home control. Others may be feeling a little timid. "After all," you might think, "what if I do it wrong?"

Take heart. There are practical things you can do now to control your home that won't cause any difficulty other than a little electrical energy wasted and perhaps some annoyed neighbors. Generally speaking, you can control any on-off device like electric lights and appliances with hardly a second thought. You can even dim lamps by using a dimmer module.

But some appliances shouldn't be controlled; if you have a controller on a freezer, for example, and something goes wrong, you could lose a lot of food—and food's expensive. There are other things around the house, too, that you might not want to fool with. The furnace is one of them.

John Peterson ought to know. He's an Apple owner who also uses an Apple at work. Work is Honeywell, Inc., where he's a senior product specialist for thermostats. He says that while he knows of several home-control functions that are easily automated with a computer, heat isn't one.

Peterson says, for example, that Honeywell just developed a thermostat for a heat-pump system. Before that was developed, Honeywell was saying that heat pumps shouldn't be controlled by such devices, because the dynamics of the system are a function of too many variables. If one of the variables gets a little out of the control range, the result can be a rush of power to the system's back-up resistance heating coils—a large electric energy waster. That's why Honeywell's new thermostat was developed at a cost of several million dollars.

There are other kinds of heating systems, of course, and you might want to control one. But then you should realize the problems involved. Peterson says that computerized control of electric air conditioners and forced-air heating systems is probably OK. Such systems are one-stage devices, which means they're controlled in simple on-off fashion, sometimes called "bang-bang" control in the industry. More complicated systems, like zoned hot-water systems and heat pumps, require more sophisticated control. You can easily put a computerized on-off system on a forced-air furnace by putting a relay in the low-voltage thermostat wiring and interrupting current to the thermostat. But, warns Peterson, instead of a setback, you have turned the furnace off. If the temperature outside takes a nosedive, you could get frozen pipes.

"We've struggled with a lot of home-control scenarios," Peterson says, "and test marketed some of them. But right now, I think the best solution for home heating control is a clock thermostat, when you take economics and convenience into account. On-off control is OK, but beyond that, it's probably not easy, or cost effective, to try to get more sophisticated."

If you're one of those people who just wants to do more with your computer, though, you might want to look into TomorrowHouse, marketed by CompuHome Systems in Denver, Colo. This is a complete system that allows home control, including certain furnace and air-conditioning controls, for the Apple computer.

TomorrowHouse includes both hardware and software to accomplish home-control activities. In particular, it will control the furnace through a device called the CompuStat. The company provides instructions for installing this device, along with warnings for those instances when you should have a qualified electrician do the installing. TomorrowHouse even includes a hot-tub controller.

We can't guarantee that TomorrowHouse will save you money operating your home, or that any other home-control system will, for that matter. But you'll have fun working with a home-control system.

mometer I could get, a Kodak product that's used for measuring the temperatures of film-developing chemicals. Then I started heating water on the stove with the thermistors in the pot. I have a Votrax Type 'n Talk voice synthesizer on my computer, and I rigged it so the Votrax unit would tell me what the value of the byte at the joystick port was. So there I was, juggling hot water and ice, and the thermometer and the thermistors which were hooked up to the joystick port. The computer would periodically call out '45 .....47 ..... 46...' and I'd write down the real Fahrenheit temperature reading on the thermometer. It was really pretty neat—I didn't have to run back and forth from the stove to the room I have my computer in to check the screen."

Using the calibration figures he derived from his stove-top experiment, Mosher was able to write a program that would convert the temperature-sense readings to real-world temperature figures.

So how does it happen?

Paralleling the hardware-development effort was a software-development chore. No computer-control system can control anything without having a program that tells the computer what to do. There are several aspects of a control program, too. The heart of any of them has to be the routines that do the actual device switching, whatever devices are there to be switched. The Plug n' Power owner's manual has listings of BASIC programs that provide the actual commands to the Plug 'n Power controller. Then, equally important, is a routine that allows the user to tell the computer what he wants the devices to do. Once these portions are programmed, then "frills" can be added—things like completely automatic sequences that can run unattended for days, calendar-reminder functions, and the like.

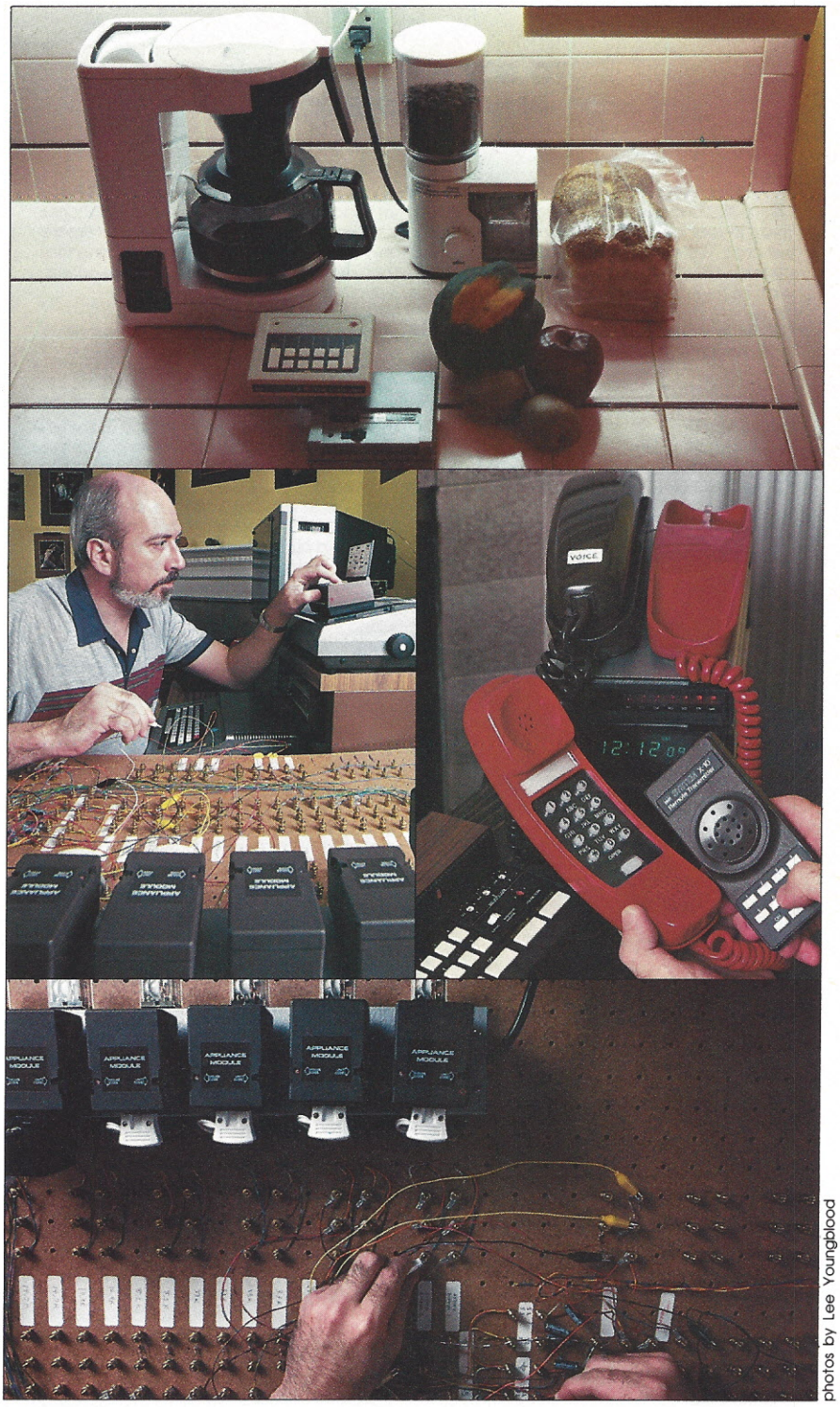
"I had delayed getting a personal computer too long, considering the way I like to fool around with machines."

Mosher began his software-development effort by designing the syntax he would use to enter commands into his control program. Paralleling that development was the development of the editor that would use the syntax. "That's really the key," he says. "You have to decide just how you're going to tell the computer what to do. That means you have to know what the computer will do and then figure out how to tell it to accomplish those functions. Although I did figure out the syntax for the early functions I was using, I'm still involved in syntax development every time I try to add some new function to the program."

After the development of the syntax and editor, Mosher wrote his clock/calendar program, which he needed to make his home-control system automatic. When he finished the clock/calendar, the next step was the controller itself, which uses both the input syntax and the time inputs from the clock/calendar program to accomplish the control functions. In the case of the watering system, for example, the controller must read the sense inputs—soil moisture, temperature, and light conditions—to decide if there are sufficient conditions for taking some action.

Mosher estimates that it took him "about a year of serious hobby time" to get to where he is today. During that time he expended relatively little effort in installing the hardware. Most of it—sandwiched in between his job and other requirements—was spent developing the control software. Not that there weren't hardware problems.

One day Mosher thought that he was receiving BSR signals from another house, because after he turned on the lights over his plants, they got turned off. He knew he wasn't doing the turning off so he guessed that someone on the same power transformer was signaling his devices, and the signal was getting into Mosher's house. "I figured I'd stop that," he



photos by Lee Youngblood

The coffee pot was one of the first things Mosher put into his home-control system. He controls it and similar appliances through a matrix of modules and relays. Work-in-progress includes automatic computer voice response over the telephone.

"I replaced every light switch in the place. That's some kind of kingly luxury."

TO GET YOU STARTED IN HOME CONTROL

The following manufacturers sell products that interface various computers with the BSR X-10 controller. The controller is a device that sends control signals to remote switches through existing household wiring. One X-10 controller can control as many as 16 remote switches. The switches, in turn, can control lights (on-off or dim), appliances, and anything that can use 110 V AC as an appliance does. BSR X-10 controllers are sold at various retail outlets, such as Sears Roebuck and Radio Shack, under various brand names.

This list of vendors was supplied by David Rye, senior applications engineer, BSR America, Blauvelt, N.Y.

CONNECTICUT MICROCOMPUTERS 36 Del Mar Dr. Brookfield, CT 06804 (203) 775-4595 TWX# 710-456-0052	Has developed a "Universal" interface for the X-10 System. This interface transmits directly onto the power line and controls standard X-10 and Leviton (Little Neck, NY) modules. It can be supplied as a P.C. board, compatible with the S-100 bus, and will interface to the Apple II and other computers. It also has a number of digital inputs, enabling it to be connected, for example, to a burglar alarm system and will perform a stored sequence upon say, the opening of a window.
INTERFACE TECHNOLOGY Box 383 Des Plaines, IL 92103 (312) 297-2265	Low-cost interface for the TRS-80. Can control 256 modules. Software available on cassette or disk.
RADIO SHACK 1 Tandy Center Fort Worth, TX 76102 (817) 390-3000	Low-cost interface plugs into cassette socket on TRS-80 Model I, Model III, or Color Computer. Comes complete with software on tape. Can control up to 256 receiver modules.
SCI-TRONICS 523 F Clewell St. P.O. Box 5344 Bethlehem, PA 18015 (215) 868-7220	Has developed an X-10 interface which transmits directly onto the power line and controls standard X-10 modules. It can be supplied as a P.C. board, compatible with the S-100 bus. A "real time clock" for the interface is currently being developed.
THUNDERWARE P.O. Box 73322 Oakland, CA 94601	Real time clock card for Apple II with ultrasonic interface to BSR X-10 controller. Scheduler software to control BSR controller.

A complete home control system for the Apple II Plus personal computer with 48k of main memory is available from:

COMPU-HOME SYSTEMS, INC.
3333 East Florida Ave.
Denver, CO 80201.

Books in print or about to be published about home control are:

THE APPLE CONNECTION James W. Coffron Sybex, Inc., 2344 Sixth St. Berkeley, CA 94710 (415) 848-8233	YOUR COLOR COMPUTER Doug Mosher Sybex, Inc., 1983 2344 Sixth St. Berkeley, CA 94710 (415) 848-8233

says. "I turned the lights on and off, for a period of time. I never had the problem again. I think the neighbor figured his system was malfunctioning and took it back for a refund."

Mosher's hardware cost him under $1000. The Radio Shack Color Computer, with extended BASIC, sold for about $400. He bought the Plug 'n Power controller for $40. He needed a cassette drive for the program and to periodically store the status of the system. The program will reload after a power failure, to catch the system up with the clock. He has two Toyo Menko TV sets that he uses for monitors. "They give as good a picture as a Sony," he says. He paid about $200 apiece for them. He also got BSR switch modules for about $20 each. The Heathkit automatic sprinklers were $40 apiece and then there were cadmium-sulfide light-sensing cells, thermistors, resistors, and wire. He found he had to buy some capacitors because the sensing wires that run to his plants act like antennas and pick up 60 Hz AC hum. Capacitors between the lines short-out this hum and allow the computer to get accurate indications of the soil moisture.

Mosher points out that it's getting easier to implement a system like his because literature telling you how to do it is appearing on the market. In fact, his first book, called *Your Color Computer*, available this May from Sybex, Inc. (Berkeley, Calif.), will contain his program and his multiplex circuit. "Any person can get started in home control," Mosher says, "for about $600, including the $12.95 for my book."

The old standby

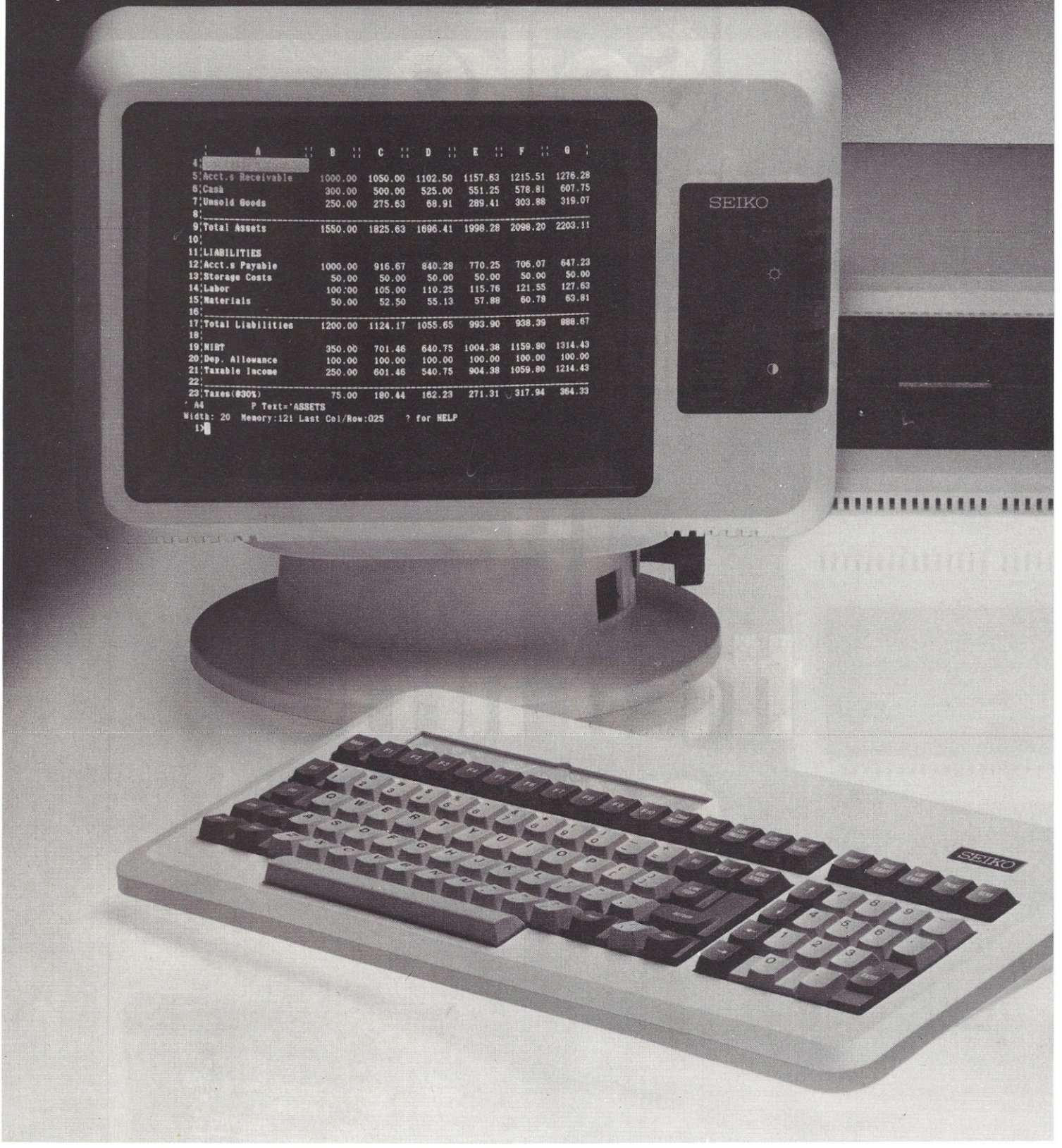
Using a TRS-80 Color Computer for home control is a relatively new development. People have been using Apples for general control applications for a number of years. And home control with Apples has been a top-priority project with many com-

(continued on page 187)

Once upon a time Seiko changed an industry.

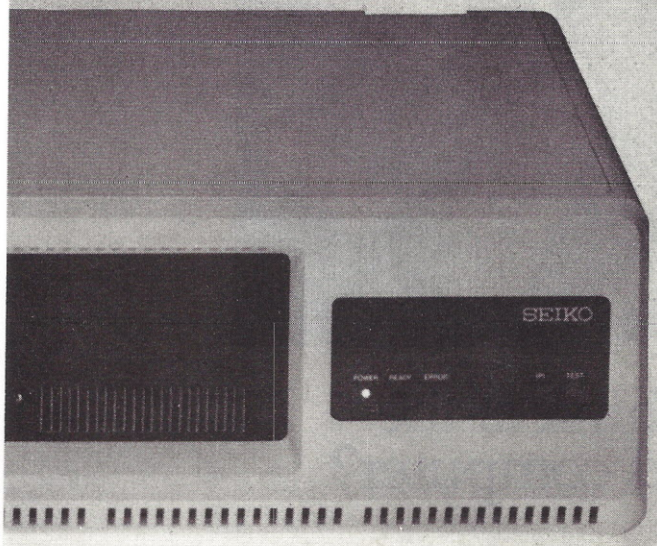
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CIRCLE 32



Which do you think is the more sophisticated computer?

Epson.

The big differences between the Epson HX-20 Notebook Computer (on the left) and the Apple Computer (on the right) are: 1) the HX-20 doesn't need a power cord, 2) the HX-20 weighs only about four pounds, and 3) the HX-20 costs a lot less money.

The Epson HX-20 Notebook Computer has a full-size keyboard, a built-in LCD screen, a built-in printer, 48K of combined RAM and ROM memory, and an internal power supply that will keep it running for over 50 hours. So you can do computing and word processing virtually anyplace you happen to be. Whereas, with the Apple Computer, you can only go as far as an extension cord will take you.

And on the HX-20, you get communications interfaces, upper and lower case letters, five program areas, a full 68 keys including an integrated numeric key pad, an internal clock/calendar, and the screen and printer. Standard. On the Apple, you pay something extra for each feature — if you can get them at all.

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CIRCLE 35

When The Boss Broke The Rules...

He got his own personal computer, shaved $3000 from a printing project, and solved a problem in one of his plants. Now 32 of his executives are personally computing to try to keep up with him

by Marvin Grosswirth

Henry Lee has two traits that are somewhat disconcerting: He acquires personal computers the way some people acquire art; there are now 32 of them scattered throughout his company. And he has a maddening propensity for violating some of the rules that consultants, data-processing managers, and other business gurus seem to consider sacrosanct. But the net result is that he's getting better reports from his staff, maintaining tighter control of his company's research and operations, and—not incidentally—having the time of his life.

In fairness to Henry Lee, it must be stated that those personal computers are all working hard at earning their room and board. As for the rules—well, Henry Lee doesn't set out to break them. It just works out that way.

As a scientist with a doctorate in physical chemistry from the Massachusetts Institute of Technology (MIT), Dr. Lee knows that certain rules must be observed. But as the founder and president of Lee Pharmaceuticals in South El Monte, Calif., he has learned that to be a commercial success you have to recognize that sometimes the old, tried and true axioms can become tired and false constraints.

Lee Pharmaceuticals is a relatively small company with about 90 employees and gross sales of approximately $12 million in fiscal 1982. The firm was founded by Lee, originally as an independent arm of another company, to manufacture polymer products for medicine and dentistry. Its line has now expanded to include fingernail extenders, diet aids, and skin-care products.

The simplest way to understand how Henry Lee manages his company and his life by breaking rules is to examine some of those well-accepted axioms and how he chooses not to accept them.

Managers should manage companies; computer experts should manage computers.

Early in 1979, Lee Pharmaceuticals already had a computer: a Basic Four mini that performs the usual "back-office" operations—accounting, payroll, inventory control, and the like. "I had a vice president of finance," Lee explains, "who had degrees from MIT and a Harvard MBA, and he was in charge of our Basic Four computer. I also had a new vice president of manufacturing, a Cal Tech graduate in chemical engineering. [The chemical engineer] said he wanted to put the manufacturing department on a computerized system instead of the manual system we were using, and there was a big argument: Should we buy a bigger computer for the overall company, or should manufacturing have its own large computer while finance continued with the computer it had?"

While listening to the argument, Lee realized that computers had come a long way since he had last studied them closely in 1966, when he participated in a panel on computerization, and could accomplish considerably more than he had thought. He also realized that in essence, he had very little idea of what his two vice presidents were talking about. "I didn't know what to do about it," he confesses. "I thought of taking a course someplace." He remembers seeing an advertisement for a course in San Francisco that would require a week of his time and would cost about $1000, plus hotel expenses and air fare. "I would have come home with a big, thick notebook," he acknowledges, "and maybe I'd know something about computers."

One afternoon he strayed into a Radio Shack store in search of a videocassette recorder. They had none. What they did have, however, was a TRS-80 Model I, playing chess. He noticed that the machine

Marvin Grosswirth is a New York-based free-lance writer who specializes in computers.

". . . I figured it was better to buy a thousand dollars' worth of hardware than a thousand dollars' worth of course, and wind up with a notebook."

was being loaded from a cassette player. "A tape cassette can hold an awful lot of information," he said to himself. "If this computer can handle all the information that's on that tape, it must have a lot more power than I've been giving it credit for." He watched for a while. He left the store. He returned five or six times. He got to know the store manager. He also visited "a couple of other Radio Shack stores, so I wouldn't wear out my welcome there."

Ultimately, he returned to the first store and bought the computer. "I had no practical application in mind at that point," he admits, "but I figured it was better to buy a thousand dollars' worth of hardware than a thousand dollars' worth of course, and wind up with a notebook." In fact, he paid $988 for a cassette version, with no disks or printer. "But it contained 16k of memory—a lot of computer—and it played fine games of chess and blackjack." It also came with a book that helped him learn how to do elementary programming.

Once he discovered how rapidly his computer could handle numbers, he was hooked. "I began to realize," he says, "that computers are just programmable calculators," which is somewhat the reverse of how most people think. It didn't matter; he had never used a programmable calculator, either.

You can't teach an old dog new tricks.

Lee was 52 when he bought his first computer.

He surveyed his employees to determine which ones could type, and how many had taken some sort of computer course. "I discovered that the older fellows had never touched a computer and the newer fellows had taken courses, but they'd never had to handle a terminal (outside of school), so they didn't use them, either . . . I bought a second computer for the fellows in the lab and told them to rotate taking it home nights and weekends."

Then someone gave Lee a word-processing program on tape. "When I got a printer," he recalls, "I discovered what a great feature word processing was . . . I'd been stalled by my comptroller because he kept saying we would put a word processor on the Basic Four and it would be much more efficient. Well, we got one on the Basic Four and it was a disaster."

Radio Shack wasn't selling word-processing software then, but through a local computer club he had joined, Lee discovered that "for $15 for switches and wires, you could make the lowercase display on your video screen." He bought some dot-matrix printers for internal memoranda and drafts, and a daisywheel printer for correspondence. He also bought another 20 computers from a Radio Shack franchise operator in New Hampshire, who not only gave him a better price than the local dealers, but added the "switches and wires."

Lee started working at his computer with a vengeance. Of the various projects he began, he says, "The one I like and use the most is the photo offset printing estimator." Whenever he planned a printing project, he would lay out the specifications for the in-house print shop and, about a week later, would receive a cost estimate. Invariably, it would be too high, so he'd change a few specs and back it would go for another estimate. "That took another week. Then he (the print-shop manager) would suggest that it might be cheaper from an outside print shop. It just took forever to get the estimates," he now recalls, the old frustration still tinging his tone. Lee sat down with the manager, asked some questions, went through the print shop's operations, and wrote a program "so that I just type in the 20 or so variables I'm concerned with and it gives me a cost estimate." Change a variable and you get a new estimate—almost instantly.

"The printer was sending an awful lot of stuff out because, he kept telling me, it's cheaper on the outside," Lee says. "Well, with this program, I found out he was sending stuff out because he didn't want to work Saturdays, even though his salary level called for Saturday work when it's warranted. On the first booklet I designed using that estimator, I saved about $3000. That paid for a computer with a printer."

Spurred by the efficacy of the printing estimator, Dr. Lee decided to look more closely at a recently purchased chemical plant that was proving to be less profitable than had been anticipated. "To teach myself the process, I wrote a program of what we call the material balances of the plant—your starting inventories, how much you produced, and how much you sold—to check out the chemical conversion efficiency. I was able to monitor the operation of the plant from a distance. Within four months, I fired the plant manager."

Young computer-literate hotshots with engineering degrees and MBAs are about to take over from senior executives because they are familiar with the computers that help make management more efficient.

George Tripp, the company's packaging engineer, is described by Lee as "a 65-year-old bachelor." Tripp had been plagued with an irritating problem: In the U.S., corrugated boxes are manufactured according to "bursting strength" standards. But the International Air Transport Association, which regulates international air shipments, requires that such boxes conform to "crushing strength" standards.

(continued on page 220)



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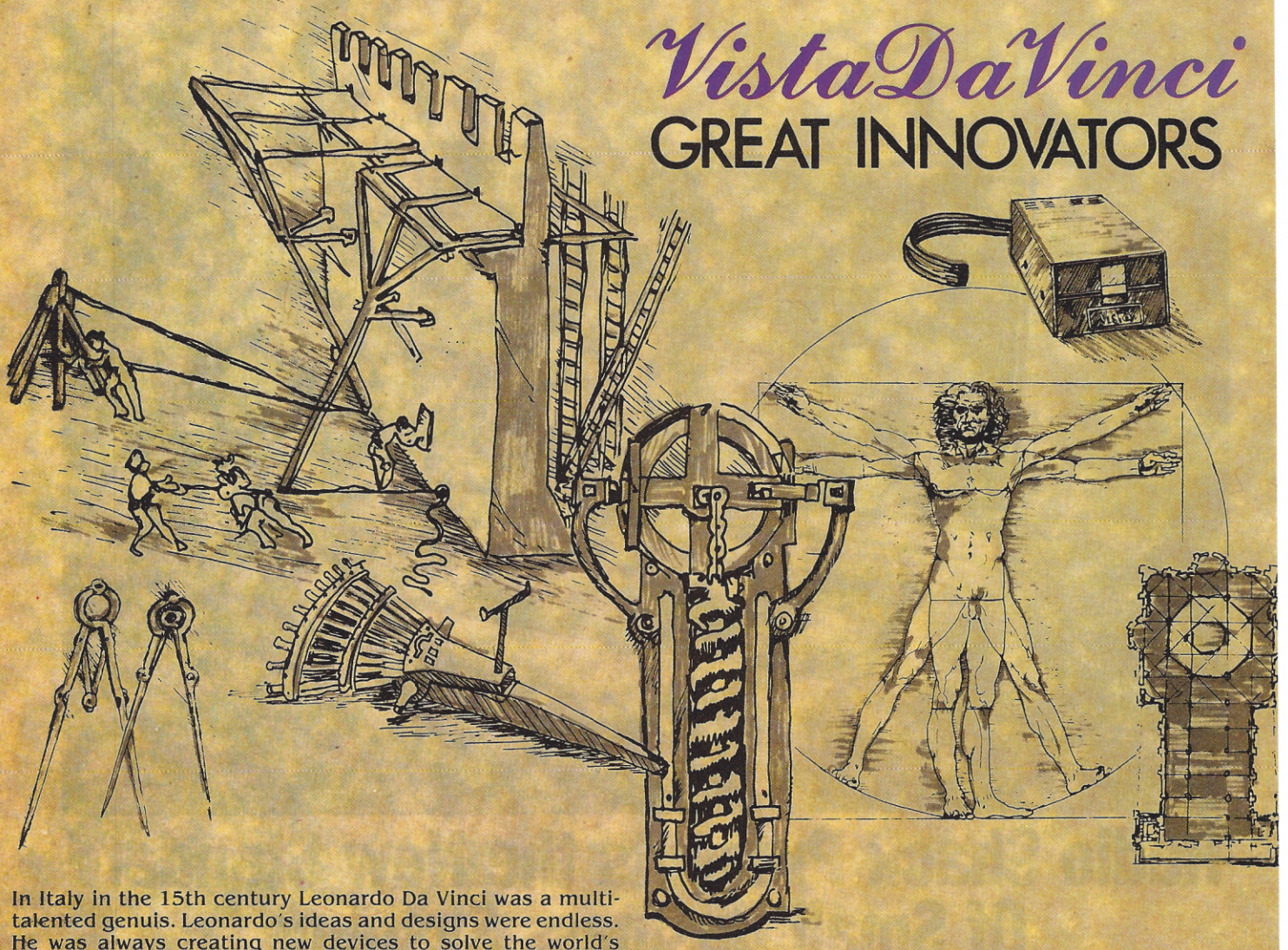
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CIRCLE 38

The Artistry Of The Computer Artist

A New York musician and a California artist have integrated personal computers into their arts, creating new forms of music and animation

by Trudy E. Bell, Associate Editor

Music by means of a personal computer that anyone can play, regardless of age or experience—and play as an ensemble—and that sounds good? Multicolored images that melt and respond to the movements of a performer to create a new type of modern dance? Musician Paul DeMarinis and video artist Ed Tannenbaum have created exactly these things. DeMarinis and Tannenbaum are but two of a new breed of artists who incorporate the power of a personal computer into their work to achieve art forms of a complexity and responsiveness otherwise unattainable.

Curly-haired DeMarinis, 34, shares a makeshift studio in the cavernous living room of the New York loft belonging to his partner, David Behrman. At one end of the room is a long table piled with two partially disassembled Apple II Plus personal computers and an odd mixture of other electronic and musical equipment. Flat, grey cables connect one of the personal computers to the musical instruments—four wooden paddle-like instruments that vaguely resemble slender electronic guitars without strings. The entire front surface of each "guitar" is covered with smooth, blue plastic inlaid with a series of bright copper strips resembling frets—touch-sensors that communicate through the personal computer to evoke percussion, bass, harmony, and melody.

When any four people begin running their fingertips back and forth along the instruments' touch sensors, a rousing bluegrass melody springs out of the speakers and fills the room, soaring up and down the scale to a knee-slapping rhythm. Chords modulate with all the rich transitions of a practiced bluegrass band improvising on drums and electronic guitars.



photos by Robert Foothorgs

Musician Paul DeMarinis tests the sounds from a touch-sensitive instrument.

"The personal computer is used as a mediator or orchestrator among the different instruments," DeMarinis explains. "We use personal computers for musical intelligence—tonality, rhythm, and so forth. We've also designed responsive software to organize things, to avoid musical 'collisions' that would sound dissonant or give badly timed beats—and to have the wits to figure out what the people are doing spontaneously and make it sound good."

It does sound great. From past experience with experimental electronic or computer music, one might hardly expect to evoke the Blue Mountain Boys. DeMarinis smiles. "We designed this piece, which we call the 'Music Room,' as a permanent exhibit which is now in the Exploratorium in San Francisco. We intended it to enable anybody to play together as a band. We chose a pop or Nashville background because that is an idiom familiar to most people—one they love and enjoy."

DeMarinis's love of music extends back to his youth. He began experimenting with electronic music before he graduated from Antioch College in 1971. While studying at the Center for Contemporary Music at Mills College in Oakland, Calif. in the early 1970s, he built hardware and several small synthesizers to achieve some novel electronic effects. It was

in the mid-1970s that he began using personal computers in his live performances. "I got one of the first Kim-1s in late 1975, the 6502 demonstrator system," he recalls. As soon as he figured out how it worked, it occurred to him that he could use the personal computer to store precomposed material in the memory that could be called up in performance, at will. In fact, after some experimentation, he found that he could access the personal computer's memory from an instrument with touch-sensitive circuits—and that he could define each key of the musical instrument in the software to call up a whole sequence of tones or rhythms. "It was a natural step then to realize that I could write the software so that any number of people could play several of these instruments together as a group," he continues.

DeMarinis picks up one of the slender guitar-like instruments. Closer inspection reveals that the blue plastic surface is actually the turquoise fiberglass-epoxy backing of circuit boards. "Although the four instruments look alike, each has a separate musical function. All four interact with one another through the software," he explains. "This one is the percussion instrument, which determines the meter and the tempo." He touches one of the sensitive copper strips on the neck and a lively toe-tapping rhythm of cymbals and drums beats through the speakers. "The 23 strips on the neck select the beat and the eight strips on the body determine the tempo, fast or slow. The ones up near the top of the neck are more exotic—they're for me!" he grins, brushing one. The speakers rocked with a complicated tango-like staccato of suspended beats.

"This second instrument acts as the bass, which steers and directs the basic tonality of the music—the underlying key." When DeMarinis touches its copper sensors, the speakers moan with a low note similar to that from an electronic bass guitar. "The adjacent touch-sensors produce tones closer together harmonically—not ones just higher or lower on the scale.

"This third instrument creates the harmony and the picking patterns for musical texture—just like a guitarist might strum or pick the strings in a different way, depending on whether the piece is baroque or salsa. And the fourth instrument creates the melody over the whole range—in fact, you can play good music simply by sliding your fingers up and down the neck." He runs his hand down the length of the instrument, and the room fills with a smooth series of singing chords that transpose and blend in the pleas-



DeMarinis and several visitors to San Francisco's Exploratorium try their skill as a spontaneous ensemble in DeMarinis's exhibit "Music Room." Each of the five guitar-like instruments has a distinct musical function, orchestrated by an Apple II Plus.

"Through the personal computer, the musical instruments genuinely interact, responding to what each player does."

ing transitions of a popular ballad. "Through the personal computer, the instruments genuinely interact, responding to what each player does," DeMarinis explains. "Through the software I've given each instrument a priority. For example, the other three instruments are slaved to the beat from the percussion instrument so that everyone can stay together. Similarly, the bass defines the underlying key for all the instruments—to the point of even altering the melody instrument by half a tone up or down to avoid sour notes.

"All four of the instruments are connected by a flat cable to a custom-designed circuit board in the personal computer. Every three milliseconds this board sequentially scans each of the 31 touch-sensitive areas on the four instruments, and leaves the information about their electronic state in certain memory registers. The rest of the program interprets that electronic information musically, to determine what notes and beats are going to be played—and runs the output drivers to three Casio MT-30 synthesizers and one Corg R-55 rhythm synthesizer. I chose the Casio synthesizers because they sound the best for the money, but I use only the inner electronics. In fact, I've actually thrown away the piano-like keyboards since I've designed my own touch-sensitive instruments.

"The program is written in Micromotion Forth, which is the only high-level language fast enough to be responsive in real time. For performances I can store the electronic information on floppy disks, retrieve it, overdub it, etc., to create any effect I want."

DeMarinis's quest to write responsive programs has led him to analyze and dissect the structure of music and to explore the very nature of musical intuition. "I was amazed to discover that what I had always thought of as indefinable tricks of the trade in music turn out to be definite states, one leading to the other," DeMarinis exclaims. "The decisions of blending pitch in bluing notes follow some pretty simple rules in coordinating harmonic changes in melodic direction. I've been able to capture some of these states in the software so that the players can play intuitively, by ear, after just a few minutes.

"All the software definitions of the touch-sensitive areas are based on musical intuition rather than formal music theory. If there's a bad change in a song playing on the radio, anyone can tell someone hit a wrong note. People do know harmony—they just don't know how to do it. A keyboard doesn't fall naturally under their hands, and the intuitive things are hard to learn simply because of the mechanics of the instrument. Also, the dexterity required for several people to keep together in a group takes a long time to learn.

"Writing the software was a real trade-off between making the instruments too automatic, like a player piano, in the interests of always creating good-sounding music—and yet making them responsive enough so that you can experiment on them and acquire skill."

Taking the show on the road

DeMarinis and his partner Behrman have created a road show called "Sound Fountain"—a traveling system that has been installed as a temporary exhibit in several places around the country. It first appeared for five weeks at the Hudson River Museum in New York in the spring of 1982, followed by a 10-day stand at the Museum of Contemporary Art in Chicago, for Mayor Byrne's "New Music America." "Sound Fountain," which has quite a different character from "Music Room," is coordinated with cartoon-like videographics of Egyptians and Aztecs playing drums and cymbals, and moving their arms and legs in a whimsical manner as they dance across a large-screen television in direct time to the music.

Most recently DeMarinis and Behrman have blended music and graphics in a musical video game installed at the Danceteria, a New York City disco nightclub, in December. In the game the musical touch-sensors are embedded at the four edges of a table around the side of a large video monitor, which lies face-up in the table's center. In the center of the screen is a large crybaby face that rotates randomly; out of its wide-open mouth spew animated images of musical notes, dancing dollar signs, eyes, kisses, and dancers—each gyrating to its own musical motif. At the edge of the screen are animated images of four hands, whose fingers move back and forth to catch the objects in response to the players' touching the sensors around the table's edges. A caught object disintegrates in an agreeable musical tinkling. "It's a cooperative video game, not a competitive one. It's a musical adventure, and there's no sound penalty if you miss." He chuckles. "As an afterthought we realized it was kind of a negative Pacman—with objects coming out of the mouths of babes instead of being gobbled up!"

DeMarinis is now working on ways to make his instruments harmonize in real time, and to coordinate the instruments in live performances with a singer. "A woman can sing very pure tones, and I'm now experimenting with using pitch sensors that can respond to the voice and change harmonic and rhythmic accompaniment. Certainly the personal computer brings a grander scale to what I'm able to do—coordinating a sequence of actions, and keeping a history of actions, so that it can make good musical decisions based on that history. And only with the computer can I possibly coordinate the actions of several people in an ensemble."

A rainbow of dance

Across the country in California, Ed Tannenbaum is using a personal computer to choreograph a blend of visual art and dance to create what he

"Many musicians and artists seem to be able to tune into computers right away. They're natural programmers."

calls "a hybrid of movement and electronics." The beauty and surprise of his innovative choreography is revealed on stage when tapdancer Laurie McDonald trips the light fantastic to Duke Ellington's "In the Mood." Next to her, dominating the stage, is a large rear-projection screen, freezing instants of her live dancing silhouette to paint a sequence of brilliantly rainbowed echoes of her sweeping arms. Now her silhouette splits into two mirror-image dancers; now her one image kaleidoscopically disappears into itself, except for a geometric symmetry of moving elbows and knees. Frames freeze, close-ups dissolve, and always the colors merge and explode in rich-hued mobility.

The image on the screen is projected live by a video system that Tannenbaum has connected to an Apple II Plus personal computer programmed in Forth. As a television camera scans the moving dancer, the computer converts the analog image into digital information, which it maps into a frame-store memory under computer control. Depending on the visual effect Tannenbaum desires, each bit of digital information is assigned one of 4096 colors from a premixed electronic palette—simply by touching a touch-sensitve keyboard in front of him on the stage. Laurie McDonald, who monitors the image herself as she dances, sound-triggers the sequence of her freeze-frame images when she pounds the stage with a particularly emphatic tap. "Without the personal computer I couldn't have achieved any of these effects or their responsiveness in live performance," Tannenbaum asserts, wiping his damp forehead.

The similarity of Tannenbaum's hardware and software to DeMarinis's setup is not merely coincidental. Tannenbaum, now 30, was introduced to microprocessors about three years ago by DeMarinis, shortly after Tannenbaum went to the Mills College of Contemporary Music as Technical Director. "When I got there Paul was taking apart a Speak-and-Spell by Texas Instruments, trying to figure out how it worked because he wanted to make it sing," Tannenbaum grins in remembrance. "He finally got the thing to dump its memory into a teletype so he could see how the words were spoken. And he did finally get it to do a kind of pleasing chant. At the time I knew little about computers and was very impressed.

"Before I went to Mills I had done a lot of work with videotape, trying to create certain special effects by painstaking editing. For certain visual effects I built my own equipment, including primitive logic boards. I had some pretty grand ideas of what I wanted to do with real-time movement of dancers' whole bodies. But although I could eventually create many of the effects I wanted, it often took two or three weeks of work to make one videotape. And the effects could not be created live in real time.

"I never used a mainframe computer to help me. In fact, I was actually a bit scared of computers for a long time. It was years before I came out here and saw that a lot of musicians were trying out microprocessors. But when I saw the complexity and speed of what the personal computer could handle, I realized immediately that a personal computer was perfect for what I wanted. Then it became the difficult process of beating the computer into submission to do what I wanted."

Tannenbaum regards himself as a new technology artist who accepts the computer as an artistic tool. "Computers never make art themselves—they're just tools for making art. Really, what I do is not any different in principle from what painters have done for centuries in grinding their own pigments to mix their own paints. The only difference is that I'm doing it electronically. I can mix up to any of two million colors—it's like painting with an infinite palette in front of you that you can mix to your heart's content. When I come up with a color set I like, I can store it in the personal computer's memory and rehearse a repeatable performance. And the speed of the personal computer frees me to do real-time animation."

In addition to his performances, Tannenbaum was an artist in residence at the Exploratorium. While there, he created the permanent exhibit "Recollections"—a series of preprogrammed effects that project blending and colorized close-ups and silhouettes that change in response to people's movements. Currently Tannenbaum is creating some of the special effects to be used on the television series "Fame." He is also experimenting with building devices to allow the dancers, or jugglers, or singers on stage greater freedom in interacting with the accompanying visual effects by snapping hand-held clickers, singing into pitch sensors, or moving in front of ultrasonic rangefinders.

The artist's apprentice

Both DeMarinis and Tannenbaum are aware that by apprenticing a personal computer they are creating genuinely new art forms—music and visual arts that combine the discipline of formal rehearsal and composition with the fluidity of live interaction and improvisation.

Tannenbaum likens the combination and spontaneity in his choreography to "visual jazz." In spite of his initial mild computerphobia, Tannenbaum was surprised at how readily he took to incorporating a personal computer into his creative work. "Musicians and artists, because of the structural similarity of their creative processes, seem to be able to tune in to computers right away. Many musicians, in fact, are natural computer programmers. I've found using the personal computer to be totally liberating. It's allowed me

(continued on page 181)

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CIRCLE 33



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CIRCLE 39

Getting Even In The Fight Against Pollution

Facts count when it comes to arousing citizen action, and on the environmental front facts have to be based on masses of data. Here's how one man uses personal computers to win against uneven odds

by Michael Finneran

How do little guys win against big guys when the battle is over something as complex and abstract as environmental pollution?

They get together, assemble masses of solid data, extract convincing facts, and get that ammunition before a lot of people in such a way that public sentiment is aroused. That's a big task, and the big guys, of course, are doing the same thing and doing it well. In many cases, until recently, it was no contest—what with all the financial resources, data bases, and powerful mainframe computers big industry has to draw upon.

"Now we have a great equalizer," says Dr. Peter Montague, a Princeton environmentalist. "Every struggle of the little guys against the big guys needs an equalizer if there is to be parity. On the frontier it was the Colt 44. Ours is the personal computer."

Montague is founder and half the staff of a small non-profit organization called The Environmental Research Foundation. His wife is the other half and the two of them, together with two Cromemco personal computers and volunteer human help, are waging several David vs. Goliath battles on several fronts at a time, from the basement of their split-level home in Lawrenceville, N.J.

The crux of what they do is data management—cataloging and managing a growing library of data. But the data doesn't pay off until extracted and massaged into convincing and understandable facts. Then the facts have to get into the hands of those who can keep pressure on politicians and voters. That puts the Montagues and their Cromemcos deeply into word processing, mailing list management, and the preparation of text for printing.

The data task alone is a formidable one. Last March, for example, when several community groups asked Montague to assess the air-quality impact of a proposed garbage-burning plant in New Jersey, he was faced with a task that required careful comparisons of hypothetical and abstract data. To come up with the full air-quality picture, Montague had to ascertain how far pollution spewing from the plant would drift, where it was likely to concentrate, and the potential levels of certain chemicals in the air—all of this for three separate proposed sites.

So Montague holed up with his personal computer and set to work with a program he'd written using pollution-modeling equations from the federal Environmental Protection Agency. He entered anticipated emission rates from the smokestack, the projected height of the plume, and the prevailing atmospheric conditions.

The projections he came up with were grim. The pollution area, he found, would be so wide for any of the three proposed sites, that residents of neighboring Pennsylvania would be affected. That was valuable ammunition for the community groups fighting the facility—and for Montague, too. One of the proposed plant sites is less than two miles from his home.

And it was ammunition that, Montague says, he could not have provided without the personal computer. "These equations are very complex, and if you had to work them out by hand or by calculator, you would simply never do it," says the tall, clean-shaven researcher. "You'd probably let the plant get built wherever it gets built, and not fight it."

Computers balance the scales

Before Montague bought his two Cromemco 3102 computers, the biggest stumbling block to keeping information flowing easily, in and out of his foundation, was the time it took to sort through the mountains of research material that he collected and piled up in his basement headquarters. But Montague has now hurdled this obstacle by designing a versatile program called Fact-Finder, which

Michael Finneran lives in Glen Ridge, N.J., and is the medical writer for The Record.

organizes documents, brochures, notations, and dog-eared book chapters that are the front line of his ability to lobby for environmental causes. "I've been keeping files for about 15 years, and retrieving information has always been the most crucial problem," says Montague, who is also project administrator for Princeton's hazardous waste research program. "With Fact-Finder I've finally got it licked."

Montague got the idea for Fact-Finder from a similar data-base management system he'd used more than a decade ago, while at the University of New Mexico at Albuquerque. But that program, Montague felt, had severe limitations. It could only receive information, collate it, and print out hard copy. This meant that Montague was able to input raw data into the computer, but he could not manipulate the data once it was in the machine. This was a clear failing when he wanted to delete or update portions of the data base, or if he wanted to design custom reports. He stuck with the system because it was all he had, and because, since it was hooked into the school's mainframe computer and he was a faculty member, he could use it at no cost.

A break with mainframes

With all its disadvantages, the program taught Montague the value of information management on the computer. And when he came to Princeton in 1979, he was determined to set up an extensive data base again, but he wanted something far more flexible. He tried to lure the University of New Mexico's program onto Princeton's mainframe, with the ultimate goal of customizing the data-base manager to his needs. That effort, though, would lead to his final break with mainframes. At Princeton computer time wasn't free, and after spending $700 in one weekend just to load the data-base manager, Montague decided to buy a personal computer and design his own software.

The result was Fact-Finder, which Montague created from the program blueprints or "subroutines" of a data-base management system called MDBS put out by Micro Data Base Systems, Inc. of Lafayette, Ind. MDBS is specifically designed to allow the user to create his own software. So, like a carpenter building a custom home, Montague chose the features of MDBS that fit his personal needs, pulled their program language out of the directory, and joined them to form a new package.

Fact-Finder does just what its name implies. It catalogues and recalls the location of facts, which can be anything from portions of the research materials Montague has collected over the years, to the reminders he leaves for himself each day. Primarily, the software serves as a cross-referenced bibliographic index to these facts. The facts themselves are mostly kept in hard copy. A fact could be a statement made about an environmental report someone's written, or "it could be a credit card number," he says, "or a phone number. It could also be a reminder that I'm going to give a speech—it could be anything. My particular interests and needs dictate what is catalogued in the program."

Fact-Finder functions like a library card catalogue. Each fact is numbered automatically when its title is entered into the computer, and that number is like the Dewey decimal number in a library file. When Montague recalls the fact number, this refers him to the corresponding fact or document located in his desk drawer or on the bookshelf, much as a library index would point a reader to a particular spot in the stacks. But instead of thumbing through a manual index file to find the referring number, Montague simply punches in one of several search terms that are assigned to each fact, and that calls up the information.

After loading Fact-Finder, the program asks him if he wants to search for a fact or carry out some other action, such as enter another fact, purge a fact, or add a search term to a fact. If he answers that he wants to look for a fact, the computer asks him to enter a search term. After entering a search term, all the facts carrying that term appear on the screen. Montague reads through the facts, notes their file numbers, goes to his desk drawer, or bookshelf, or wherever the document is located, and pulls out the corresponding information.

Generally, Montague ensures that he'll be able to find a fact quickly, by giving it both a narrow, specific search term, and several broader ones. For example, a report written by the Texas Sierra Club on Ohio industrial wastes being dumped in the Southwest might be assigned the search words "TX" and "Sierra Club." It might also be assigned the search words "chemical waste," "Ohio," and "Southwest." "Sierra Club" and "TX" would be the most specific search terms; "Ohio," "chemical waste," and "Southwest" are the broader terms.

He can also link two search terms to further zero-in on a fact. For example, the search term "landfills" brings up 145 facts. So if Montague wants information on Texas landfills, he wouldn't use the search term "landfills," because that would mean slogging through too much extraneous information. Instead, he'd type in the search term combination "TX and landfills," bringing up a scant five facts and significantly shortening his search time.

The League vs. ocean dumping

Fact-Finder was put through its paces last May, when the League of Women Voters got wind that the EPA and the federal Department of Energy were considering disposing of radioactive wastes, which were sitting in a Middlesex, N.J. dump, by heaving them into the ocean. The League knew that federal law prohibits such dumping. But it also knew

"These equations are complex, and if you had to work them out by hand you would never do it."

that the Reagan Administration was reviewing the policy with an eye toward repealing it.

So, wanting to arm itself with as much data as it could find about ocean dumping, including the legislative history and the case law, the League turned to Montague as a natural source of information. "As I collect documents about a subject like ocean dumping, I catalogue them in Fact-Finder so I can recall them," he says. Thus, when the League of Women Voters asked Montague to look into the matter, the information was, literally, at his fingertips. Using Fact-Finder Montague found about 20 different research documents about ocean dumping, which he turned over to the League.

Then, in anticipation of the speech on ocean dumping he was to give to the group, he put the 20 documents together into a new report, which he entered into Fact-Finder. The report was then automatically assigned a reference number—568.

A two-minute search

Without Fact-Finder, he says, tracking down the 20 reference points would have taken him several hours, if the search went smoothly. "I could have those same documents on my shelf," he says, "But unindexed it's like not having them at all. If you knew that every time you had to look through your library for a group of related facts it would take you two hours, you simply wouldn't keep a library." With Fact-Finder, he adds, the search for the information took about two minutes.

Fact-Finder even reminded him that he was supposed to deliver the speech. A few days before he spoke to the League, Montague punched the search term "Do It" into Fact-Finder, which called up his calendar of activities. The message was there: "PM speaks to LWV on ocean dumping of Middlesex waste Nov. 17, 8:00 at Labor Education Center, Rutgers (Fact No. 568)."

So on Nov. 17, Montague went to the file numbered 568 in his desk drawer, pulled out the radioactive waste report, and drove off to give his speech. This eliminated the hours he used to spend before speeches and presentations just making sure that he was taking all the papers he would need with him. Since his speech, the plan to dump the radioactive wastes in the ocean remain tangled in the legal seesaw.

Designing Fact-Finder went smoothly, he says, except for a few minor problems. For one, he kept running out of memory space, which he solved by limiting the number of characters each fact and search word could contain. He held the search words to 40 characters, and facts to 160.

He has one ongoing problem with the software. Fact-Finder cannot differentiate easily between variations of a search term, a common problem in many data-base management systems. For example, while hunting recently for information on landfills, he entered the search term "landfilling"—and got just one fact. Yet he knew he had dozens of landfill facts. Then he remembered that most of them were under the search word "landfills." Other data-base management systems will take into account partial, or slightly different search terms and still pull up the facts. But because Montague has attempted to streamline Fact-Finder as much as possible, his program does not. Since the term "landfilling" is just getting in his way, he plans to eliminate the term from the data-base manager using a command that lets him either exchange one search term for another or erase it. Montague's real crisis with computerization occurred before he even wrote the program. He bought his hardware in August of 1980, "and spent six weeks tearing my hair out, wondering if I'd lost my mind." The reason: "I never got the machine running at all—it simply would not work," he recalls. "You can imagine what I felt like. I used to wonder, 'Do other people have these problems? Is this whole microcomputer thing a fraud?' I would wake up at two o'clock in the morning and feel like I was living a nightmare with my dead micro."

He tried replacing two memory boards and then two disk drives. It still didn't work. Finally, his dealer replaced the entire system. There was no way to repair the original. He had simply purchased a defective machine. Montague's Cromemcos are backed up by three QUME 8-inch disk drives and an NEC Spinwriter letter-quality printer.

Throwing barbs

Self-organization and managing information were Montague's main reasons for purchasing the Cromemcos. But rather than leave the machines idle when Fact-Finder is not in operation, Montague has geared his computers to throw further barbs at his nemesis, the anti-environmental establishment. Using PeachText, a word-processing program from Peachtree Software, Inc. of Atlanta, Ga., he produces a monthly hazardous-waste newsletter for 11,000 subscribers in a fraction of the time and cost it would have taken with conventional copy editing and typesetting.

After he inputs the newsletter, he runs Word Plus, a spelling checker from Oasis Systems, Inc. of Oakland, Calif., which automatically corrects any misspelled words and hyphenates words that have been split for justification purposes. "It used to take us six hours just to hyphenate the newsletter," he says. "We're down to literally six minutes now."

Montague photographs his newsletter directly from his NEC printout. When it returns from the printer the Spinwriter spews out address labels which are slapped down, and the completed product is mailed out.

Keeping the environment clean,

(continued on page 182)

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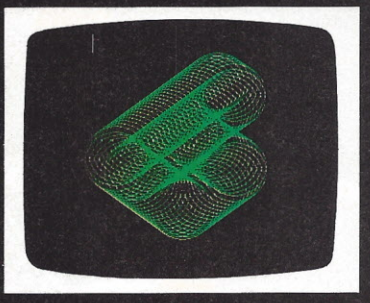
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CIRCLE 24

How To Beat A Bad Memory

One woman's determined effort to list the things she wants to remember—with the aid of a personal computer—so she can forget about forgetting

by Georgia A. Lawrence

I love lists. I have short lists and long lists, major lists and minor lists. If I forget to add some task to a list I never finish the task because I never get started on it because I can't remember a thing without a list. I can't imagine what life would be like if it were any other way. The only problem is, I have so many lists that I need a list to keep track of all my lists.

When I bought my Apple II Plus three years ago, I found that this machine could not only help me organize my lists but it was also the perfect tool to use when making lists. So I read a book on BASIC programming and started to computerize all of my lists to keep myself organized.

The first thing I learned is that the computer can store text files. These can be designed for making lists of addresses, calculations, or words. I started by entering approximately 30 items, one at a time, into my first text file—my weekly grocery list. But when I called up this file to view it, it was so long that it scrolled up the monitor until only the last part was visible on the screen. I fixed this by grouping foods into eight shorter categories of five or six items each. Thus the entire list stayed on the screen, but now I had eight lists instead of one. Before going off to the grocery store, I would call up all eight lists and copy the items with pencil and paper since I didn't have a printer. I loved it. I never forgot anything.

I began entering more lists into text files. I made lists for non-grocery items—vitamins and prescriptions from the drug store; and typing paper, pencils, and envelopes from the stationery store. My non-essential shopping list also went into a text file. This list included a new painting for over the couch, shutters for the bedroom, a new refrigerator, and china dessert plates. Although I wished for everything on this list, I knew that I could easily do without them until time and money were available.

As I entered more lists into text files I found that I had more and more lists that I really needed. I had two lists to remind me of household chores. The first, my short-term list, consisted of necessary weekly cleaning jobs such as cleaning the kitchen, bathrooms, and family room. The second list, my long-term chores list, held more involved projects, like painting the bedroom or cleaning the hall closet—things I wanted to do eventually, but not necessarily right away.

Moving onward and upward

These simple text files were perfect for me until a friend gave me a more sophisticated program which increased my fascination with computing. This new program, called File Cabinet, a public domain program from a local computer users group, let me create a file and then search, change, add, delete, or list the entire file. With this program I made a catalog of my library of computer disks, which was growing by leaps and bounds. I numbered, named, and described each disk starting with the first disk I ever used containing my checkbook balance.

I used this new program to make lists for another major interest in my life, sewing. First, I took stock of all the sewing projects I was already involved in. I listed the fabric I had, the cost of the project, and the pattern I should use. Second, I listed my favorite patterns and how much fabric each required. But the second sewing list seemed pointless. It remained in the computer, not in my pocket where I needed it when I went to the yard goods store.

It was then that I realized that all of these lists did me no good unless I could handle them, mark them, and cross off tasks that were finished. The greatest satisfaction of using a list to keep yourself organized comes from crossing off entries after they're done. Therefore, what good were all my computer lists without a printer? The purchase of an Epson MX-80 printer solved this problem.

As soon as the printer was hooked up to the computer, I printed out my second sewing list so I could take it with me on a shopping spree. Next

Georgia A. Lawrence is a self-confessed organizer and free-lance writer from Southern California.

came a hard copy of my short-term household chores list to use as a daily reminder. I also printed my master grocery list, crossed off with pencil the items I already had in the cupboard, added other items I needed, and went to the grocery store with list in hand.

My success with the printer led me to create more new lists. The first, a freezer list, contained what steaks, roasts, cakes, or muffins I had in the freezer. I printed out a master freezer list. Then I penciled in additions when I returned from the market, and crossed off deletions as I took foods from the freezer. When the old freezer list got too marked up to use, I printed a new master list and started all over again.

The birth of a program

One of my lists started as a few notes and reminders and developed into a complete computer program that I wrote myself. I took on this project because whenever I started to make plans for a dinner party I jotted down my menu and some reminders on a piece of paper. Without this list I would forget to serve the olives or pickles, which I might find two days later on the back shelf of the refrigerator, or I would forget to use the big blue bowl that Granny gave me for my birthday. Also, I would usually leave two or three chores for the last minute that I should have finished earlier in the day. I decided that it would be nice, instead of writing out all of these lists every time I gave a dinner party, if I could just press a key on the keyboard and have the computer organize the party for me. So I decided to write Company Menus and Reminders.

When I started to write the program the first things I had to consider were the kinds of items I wanted included and how I thought the program should work. Since most of the lists I had made up before I started to program were divided into two main areas—before dinner and dinner itself—I decided to make two separate programs and then combine them. The first one deals with the dinner menu, and the second takes care of before-dinner preparations. Then I decided I would need a hard copy of the whole thing for easy reference in the kitchen.

I always had my little list of dishes that I didn't make normally—dinners that I make when I have a lot of time or when I invite guests. This list became the basis of the menu part of the program. For example, the main dish section of the menu has six entries: chicken, beef Stroganoff, roast turkey, a casserole with chicken or meat, and roast beef or turkey casserole.

When I first invite someone, I sit down at the computer, run my program, and think about what I'm going to serve—which main dish, appetizer, side dishes, vegetable, salad, and dessert—until I decide which one sounds the best. Then I see on the screen what I have chosen as the final menu. The program then asks if I want to make any changes. I usually say "yes" so I can do the whole thing over again in case I've changed my mind.

The small details

After the menu is selected, the program asks what serving dishes I'll need for the different foods included in the meal. This is where I decide whether or not I'm going to bring out the good china and silver or just use my everyday dishes. If I'm having just a few people, I'll usually go whole hog and pull out the good stuff. If there are more people coming, I'll just be casual and perhaps serve dinner buffet style.

The second part of the program, the list of reminders, was developed from a list of things to do before dinner, such as put the appropriate number of leaves in the table, chill the wine, and make the salad dressing. These things make the day of the dinner party go more smoothly. The program lets me know some of the things I can do the day before the dinner party, such as polish the silverware and make dessert. It also asks for the cooking times of the various dishes I'm preparing, to help me plan my day better. If I think through the whole day of the dinner party with the help of the program, I know everything is going to go right.

There are also other parts of the program where I can input special reminders. For example, if I know that one of my guests is on a special diet, I input this fact into the program so I remember to make a special dessert for him.

After everything is input into the program, I print out the master list on an $8\frac{1}{2}$- by 11-inch paper, and from there I make up my grocery list. I also use this paper as I'm serving dinner. Before I take a dish into the dining room, I quickly look at the list and cross that item off. By doing this I can make sure I haven't forgotten anything that I had planned on.

A much easier way

Although writing programs is one way of handling long lists, I found an easier way when I bought the Apple Writer word-processing program. My love of lists truly flourishes when I use the Apple Writer program. I can arrange words in a list anywhere on the page. I can group certain items together and leave others separate for special emphasis. And I can rapidly look up and down or across any of my lists.

The Apple Writer program also prints my lists quickly using single or double spacing. I can adjust the margins. I can use page numbers or not use them at all. And I can print in all capital letters as well as upper- and lowercase.

One disadvantage of the program is that information doesn't appear on the hard copy exactly as it does on the monitor. Since my lists are for my own use only, I simply correct an improperly aligned column or a sen-

The greatest satisfaction of using a list to keep yourself organized comes from crossing off entries after they're done.

tence that goes to the next line the next time I need a particular list.

Having that problem under control, I have used the Apple Writer program to complete a list of weekly menus with different choices for summer and winter. Even here in Southern California we eat different foods in summer than we do in winter. It is so hot here in the summer I just can't bear to turn on the oven. So my summer menus consist of foods that I can cook on the top of the stove, in the toaster oven, and in the wok.

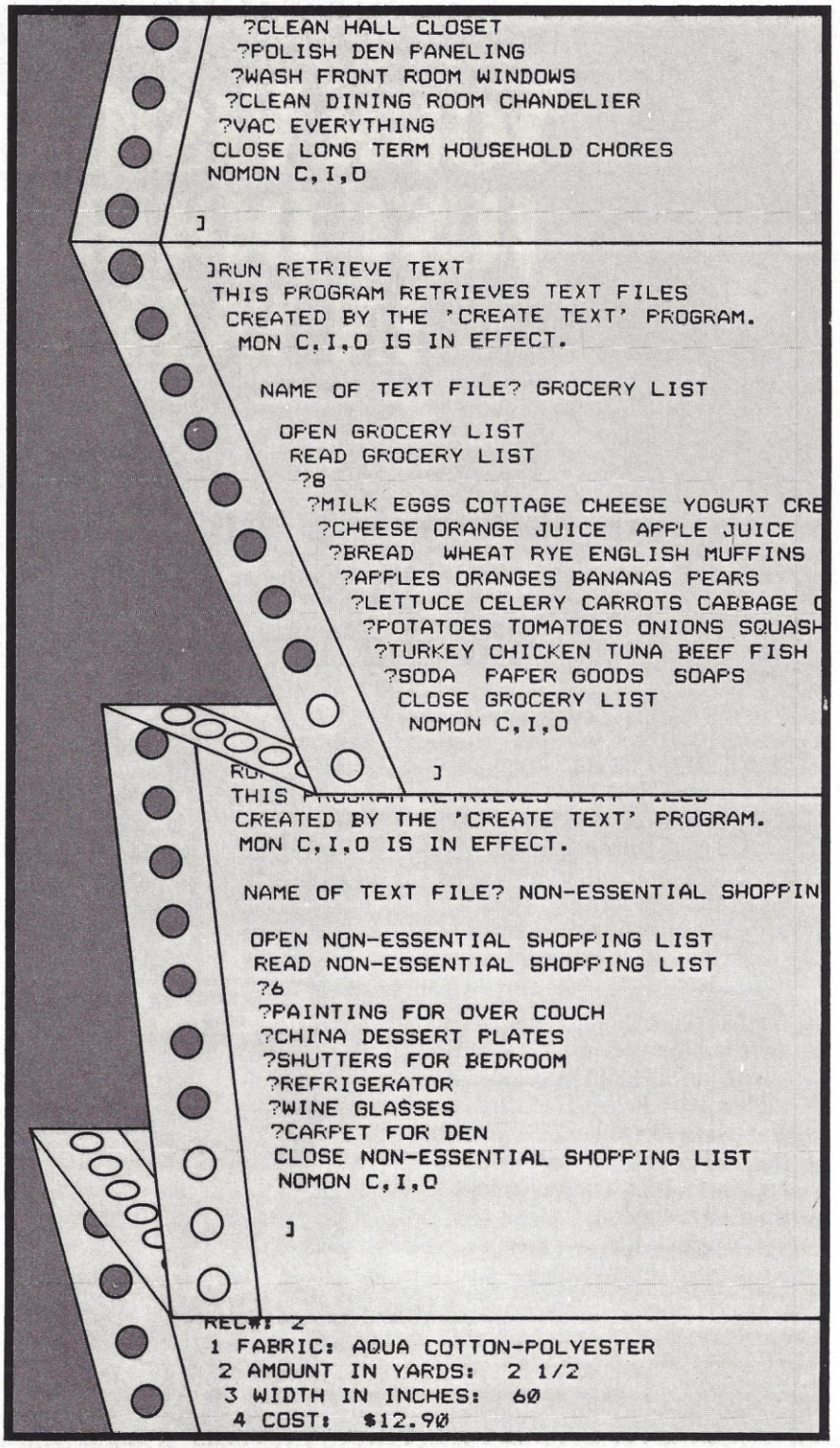
I have also assembled a list of the foods I usually eat, and the calories in those foods. Instead of taking out the calorie book every time I eat, I have one list with all of the calories for all my meals. On days when I stop counting calories, I check another list of new recipes I want to try.

More, more, more

Lists abound outside my kitchen, too, basically because I have come to rely on lists instead of on my memory. I have an income-tax list that includes any expenses and income from my free-lance writing jobs. I also have a Christmas-card list that tells me who I sent cards to and who I received cards from.

I also have two lists of my home entertainment equipment. One list establishes a number system to help me locate my phonograph records on the shelf. The other, a video tape list, shows the programs I have recorded and the length of time it takes to watch each program. After I see a recorded program, I cross the name of that particular program off the list, making room for another entry.

The computer, the various programs, and the printer work like magic for all my lists. I make new lists and change old ones every day. When I told my sister-in-law about all of my list-keeping activities, she said, "Oh, how can anybody be that organized?" Perhaps not everyone can. But if I feel disorganized it drives me crazy.



Georgia Lawrence uses her list-keeping programs, including Company Menus and Reminders, to keep track of the multitude of things she has to do and buy.

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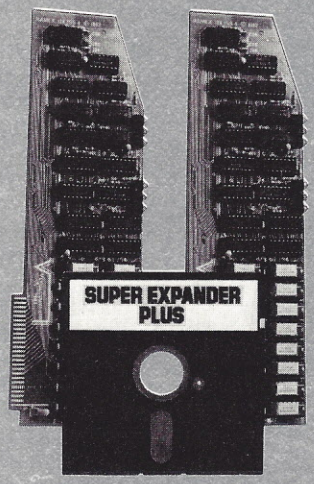
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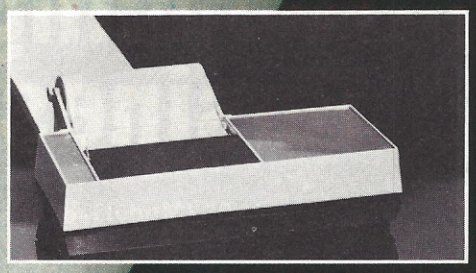
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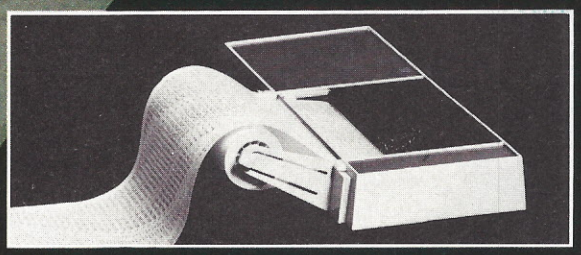
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Restoring An American Dream

Entrepreneur Jay DeSerpa, using a computer and a general-ledger package to act as his business manager, is the main mover in a multimillion dollar effort to restore a California town that time almost forgot

by Theresa Engstrom

Jay DeSerpa, a fourth-generation native of Salinas, Calif., didn't like what he saw. It was his town, after all, and he wanted to be proud of it. But it had gone from the riches of a turn-of-the-century boom town to rags. The boisterous spirit of Salinas had soured with age and disappointment. It was fast becoming an American wasteland—a seedy slum—and the people who went down its mean streets were generally on their way out of town.

DeSerpa was convinced things didn't have to be like that. But he also knew that to overhaul Salinas and reclaim its past would take more than a hammer and nails. It would require a massive influx of money and some modern-day business tools. The money, he thought, could come from partners, seed funds, and venture capitalists. The power could come from an Altos computer and judicious use of general-ledger software.

DeSerpa's optimism about Salinas rallied others to his cause—others who would rather talk about the way to build things than bemoan the fate of a town that many believed couldn't be changed.

To prove his—and their—point, DeSerpa started in the center of the mess—the heart of downtown Salinas. Under the umbrella firm of DeSerpa Associates, Inc., he pooled funds by forming partnerships and financial arrangements with small businesses in the area and began buying up buildings.

DeSerpa focused on the hotels and began his real-estate speculation in 1978 when prime sites were literally going begging. "In the '50s the downtown hotel business went to hell," DeSerpa says. "They lost out to the suburban motels. Then the downtown hotels became residence hotels. These people had no money, so that killed the retail business. Then a bad element moved in, bringing dope, prostitution, and winos. The buildings were all owned by absentee landlords who believed the way to make a profit was to defer maintenance. So the best-located blocks in Salinas, prime territory, actually, became a total slum." It was hardly the place to stake a claim for a gold mine.



Jay DeSerpa set up offices in this refurbished turn-of-the-century Salinas townhouse, part of his reclamation project.

But that's exactly what he did. Beginning with the historic 110-room Cominos Hotel, which was the centerpiece of John Steinbeck's novel, *The Long Valley*, DeSerpa bought up property all along the 100 blocks of Main Street, eventually collecting six of the largest downtown buildings. Sellers were eager to get out, and financing was cheap and easy to come by. "At 8 or 10 percent interest, with 30-year mortgages," DeSerpa says, "all we needed for a positive cash flow was to begin to manage the buildings more benevolently." With the tide of losses stemmed, at least temporarily, DeSerpa could afford to go at his reclamation project deliberately, building by building.

But as the project goes into full swing, the problem was how to

Theresa Engstrom, former editor of the New England Business *magazine, is a writer from Sharon, Mass.*





The Altos computer and Microcomputer Consultants' general-ledger software have become the project managers that are organizing the return to elegance in Salinas.

manage all this. DeSerpa Associates had grown into a hydra-headed monster which was threatening to consume 24 hours a day of his time just juggling business deals. Simply keeping track of all the separate subcontractors and financial arrangements each partnership was tied into promised to be more of a task than one man could possibly manage.

And that's where the general-ledger package came to the rescue. It was his key card, and he played it well. Considering DeSerpa's background, though, it comes as no surprise to those who know him that he would have figured out a way to make smart use of a computer's power to handle the enormous work load of a successful business.

DeSerpa found that the general-ledger package never hindered him in his attempts to use the program even in his somewhat unique fashion.

"Before I got into real estate," he says, "I was a financial consultant and relied on a Burroughs B-700 mainframe which occupied an entire room. The Altos will do everything the Burroughs would do—and more—in one-tenth the space and for one-fifth the price."

Less than a simple request

In October 1981, DeSerpa began to look around for the right general-ledger package to assist in the Salinas project. He had already defined his needs, which included instant screen access to a lengthy general ledger, and software based on 8-inch disks so he could store huge amounts of information. But more important, DeSerpa wanted a general-ledger package that could calculate complete financial statements for each main category or department of the ledger. This turned out to be decidedly less than a simple request.

General-ledger software is divided first into main departments, which most users fill in by listing names of suppliers, clients, employees, and the like. These departments are then broken down into accounts such as cash, debits, and outstanding loans, which all reflect the financial activity of the department. For this common type of ledger—a complete financial report, a journal-type business history—a separate breakout for individual departments is not usually needed. Current balances, activity to date—whatever specific information is needed at the particular moment—will generally suffice. But DeSerpa's plan was to use the main general-ledger departments as receptacles for every partnership that DeSerpa Associates was involved in. So he anticipated often needing a total financial statement—one that covered the top line to the bottom line—for his ledger departments or partnerships in order to keep track of their progress.

"It may seem preposterous," DeSerpa says, "but most of the general-

THE LEDGER'S EDGE

Many businessmen buy accounting programs for personal computers simply because they "know" they need a good general-ledger package. Unfortunately, they too often don't know what a good general-ledger package looks like.

Personal Computing asked Elliott Levy, an accounting professor at Bentley College in Waltham, Mass., to tell us what features he would demand from a general-ledger program. What follows is a checklist for making a general-ledger purchase that Levy came up with after consulting with colleagues at his school.

- The software should be able to simply determine year-to-date as well as monthly balances. This allows a businessman to compare long-term trends as well as monthly results.
- A user should be able to receive a trial balance at any time. If a businessman has hundreds of ledger accounts, Levy says, the program should be able to generate a report that would show him the to-the-minute profile of each account. In any one of his accounts, for instance, he should be able to get the total of items purchased between Thanksgiving and the first day of December.
- "It's a big plus to have a program that automatically closes out the quarterly income statement accounts," Levy says. With this feature, at any given time, a businessman could press a button, get periodic totals of all accounts, and have an open record for the next accounting period.
- Look for a certain amount of flexibility in report formatting. For instance, if a package provides an income statement, can a user get that information broken down by region or by branch office? Cheaper general-ledger packages are generally less flexible, but they may end up costing many more dollars because of their inability to analyze operations.
- Make sure that the general-ledger program has room for expansion—enough room to grow as your business grows. A program with the capacity to handle 400 ledger accounts, for instance, might seem plenty to a small business owner in year one. Will it still be adequate in year four?
- Check to see how well the general-ledger package you buy can be integrated with other systems. Somewhere down the road, many businessmen want to add an inventory program or an accounts-payable package. These programs will often work in conjunction with a general-ledger package—if your general ledger is compatible.
- Is the software user-friendly? For a businessman who is not a computer expert, the best way to test the friendliness of the system is to sit in front of the terminal and play with it for a few hours. The amount of time is a small investment compared with the annoyance of having to live with a system that nobody likes to use.
- Find out if the general ledger has an audit trail. This is a way of organizing the information that lets you see who entered each transaction and when. Then, should a question arise, the user can trace it back to its source, saving untold hours of confusion.
- Ask for names of other users to determine the level of support that you can expect from the vendor, and to avoid buying a package that is relatively untested in the market. After a businessman takes his new package home, he will still need a responsive vendor from time to time.

Having weighed all of these factors, Levy suggests analyzing the cost-benefit ratio of a particular system in relation to your business before putting down hard cash. Whatever the price of the software, will it be justified in terms of reduced costs and added benefits; e.g., will it mean fewer employees or better decision making?

One other factor to consider is the hardware, although software is obviously the key issue in general ledger. Make sure that the machine that runs your chosen software fits your planned computer budget.

DeSerpa first saw opportunity amid the ruins of Salinas in 1978 when prime real estate was literally going begging.

ledger software offers very limited department report capabilities."

Finding the type of general-ledger software he needed turned out to be as time-consuming—and as ill-conceived—as digging for gold in the lettuce patches outside of Salinas. That is, until DeSerpa spoke to a computer salesman who worked at a shop that had just opened down the street from his office. While somewhat short on experience and expertise, the salesman was, fortunately, long on the will to please.

"The store was anxious to get into the business market," DeSerpa says. "And I was the perfect customer for them."

After hearing what DeSerpa was looking for, the salesman pulled the general-ledger package from Microcomputer Consultants, a software house based in Davis, Calif., off the shelf, admitted that he had never run the product before, but rolled up his sleeves to figure it out.

"We called up the people at Microcomputer Consultants," DeSerpa says, "and they walked us through the way I wanted to use the software; that is, using the ledger departments to represent each of my businesses. The software worked for my needs. And I walked out of the store with the general-ledger package and an Altos computer to run it on."

Baking a cake from scratch

Setting up the general-ledger system in his offices, DeSerpa says, was like baking a cake from scratch, following a recipe. First he separated all the ledger ingredients—the past year's financial transactions that he had kept manually in books—and placed each of them in one of seven piles. Each pile represented one of the DeSerpa Associates' businesses. Then by following the software manual he input Department 1—Cominos Hotel Partnership and all the paperwork associated with it, then Department 2—DeSerpa Management and its paperwork, etc.

"It took us about two days to input the seven separate departments," DeSerpa says, "which break down into 350 accounts and 2000 entries. But the biggest boon for us was that whenever we hit any snags we didn't lose any time, because the software house allowed us to call them and they got us back on track. A lot of software companies invite you to call them and then all you get is a round-the-clock busy signal or somebody on the other end of the line who doesn't know what you're talking about. That wasn't our experience, though."

Using the general-ledger system now that it is operational requires a two-step procedure. In the case of the Cominos Hotel, for instance, the main ledger department is broken down into accounts like employee salaries, building permits, carpentry costs, structural steel prices, the cost of wallpaper, lights, crystal, china—in all, close to 60 line items. If DeSerpa pays the wallpaper supplier $1000, he looks up on his master chart what account number the Cominos Hotel wallpaper supplier was assigned. He simply inputs the account number, followed by $1000, and the software simultaneously subtracts $1000 from the Cominos Hotel cash account and credits $1000 to the Cominos Hotel wallpaper supplier.

"There are many times when the general-ledger package simply serves as a reminder for all those business details that would otherwise slip my mind," DeSerpa says. "I might get a letter from Bank of America that I'm low on my loan payback balance. In that case, I check my master chart and find that Bank of America notes payable is account #308. I punch in #308 on the Altos and I can scan the entire account from top to bottom, including all the transactions, dates, how much paid, and so on."

Because it is easy to get reports such as these, DeSerpa keeps closer track of his businesses by constantly printing out charts of accounts, trial balances, income statements, balance sheets, and comparisons of actual expenses to budget expenses for any one of his seven partnerships. "Plus," DeSerpa adds, "I can look at any company or project from different intermediate angles. I can ask to see all expenses for the month of December—for one or all businesses—and by pressing one command key, I'll get the printout. Or I can get all carpentry and labor expenses week by week in the same fashion."

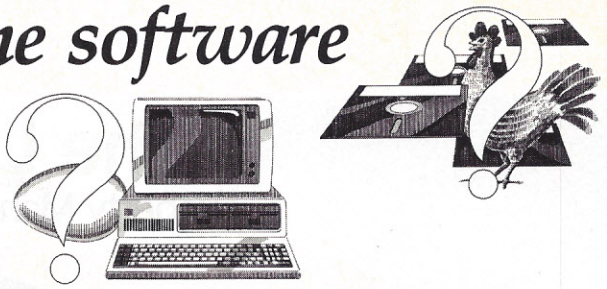
As customarily occurs, computer users tend to buy the hardware to use with a particular piece of software and for a specific task, but before long they expand their use of the machine. DeSerpa is no exception. Almost as worthwhile as his general-ledger program is the word-processing software he recently bought. "We have tons of leases, some of them 30 pages long," he says. "When we send a proposal for a reclamation project, we often include a copy of the lease. For example, using WordStar, we only have to press a few buttons to change the names on the lease and have a new one ready to go within minutes."

DeSerpa's is not only a Salinas success story. It is also a software success story. The key, DeSerpa says, is knowing your needs before you reach the computer dealer.

"Too many computer retailers were selling little electronics trinkets just a few years ago," DeSerpa says. "They know very little about your computing needs, especially if you're a small businessman. But it's easy to test out a piece of software if you know what you're looking for."

Jay DeSerpa's efforts have, so far, paid off. Salinas is slowly rising from the ashes of its own ruins. While the sounds of stately waltzes and the clatter of horsedrawn hansoms are not the common street scene in Salinas anymore, the elegant hotels are back and retailers are beginning to reopen premium boutiques in downtown locations.

Which comes first...the software or the hardware



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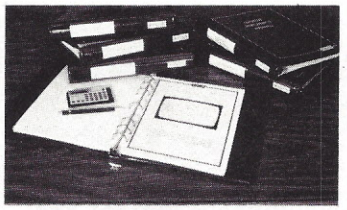
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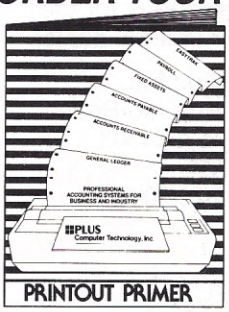
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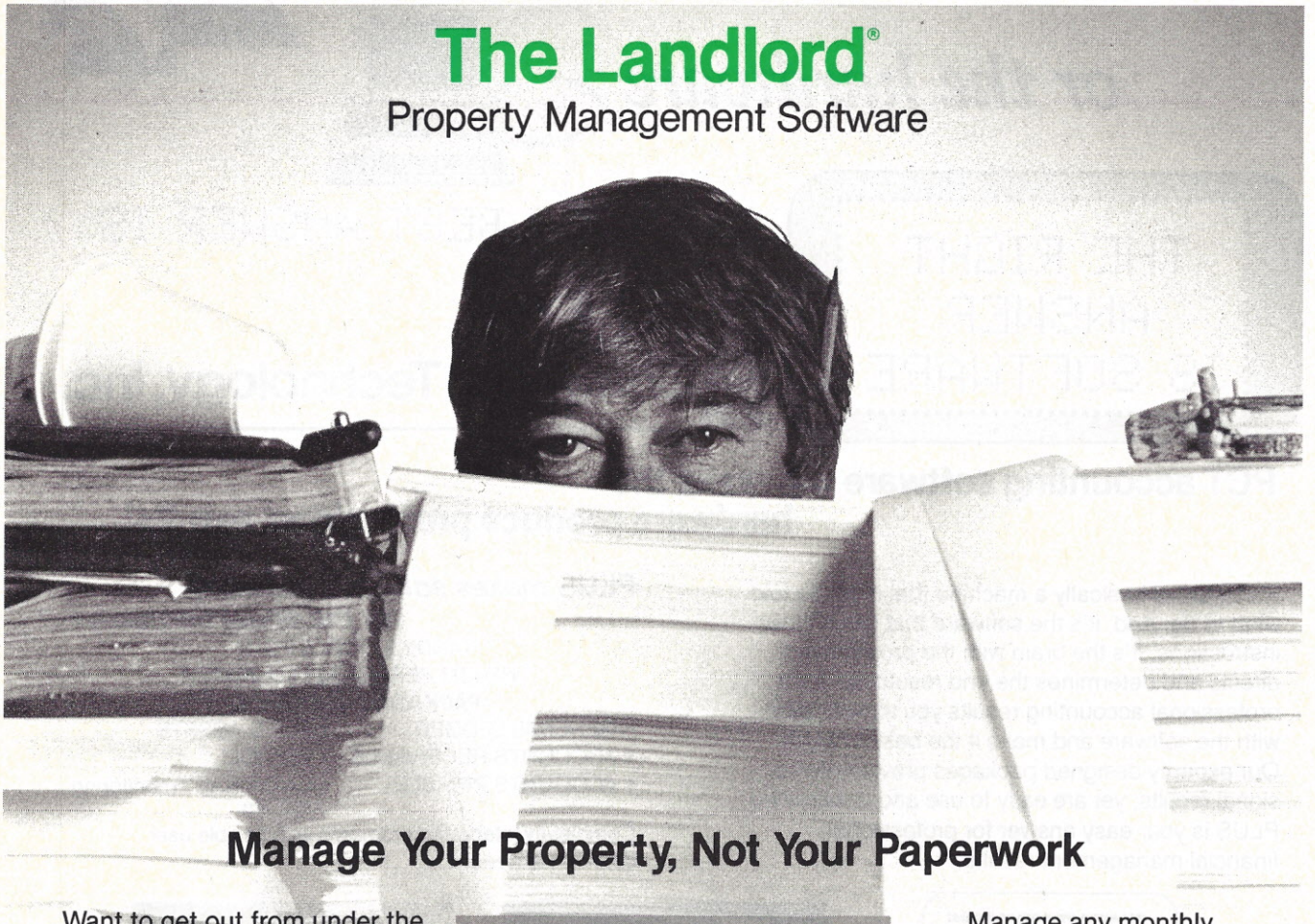
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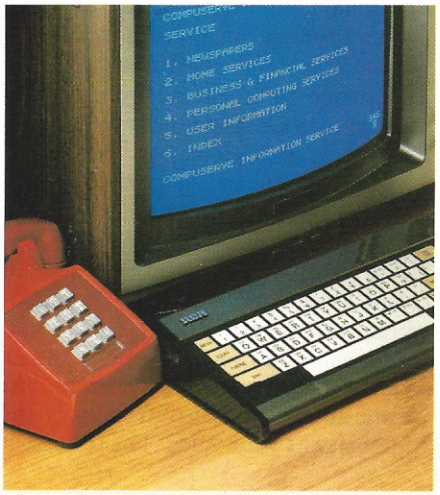
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CIRCLE 19

Data Communications: A Buyer's Guide To Modems And Software

A modem gives your computer a doorway into the phone lines. With additional software you can go through that doorway into a widening variety of information and communication services, and communicate with other personal-computer users

by Lee Thé, Associate Editor

Jack Harmon heard about the plane crash on the radio as he drove to his office in Atlanta. "My niece was on that plane," he exclaimed anxiously to his office mates as he headed for his computer.

Jack booted up a communications program and, by means of a modem, Jack logged onto CompuServe. It gave him a direct link to the complete UPI and AP news wires and their coverage of the disaster. Long before the newspapers carried the list of injured and dead passengers—and long before the airline's phones unclogged—he was holding a printout of the list which told him his niece had a fractured leg but was all right.

* * *

Frank Myers's sales territory covers southern Idaho, southern Wyoming, and all of Utah. He carries a portable computer in the trunk of his car, and uses it when he is on the road to keep in touch with his Boston headquarters through the nationwide communications utility, Tymnet. Each morning Frank pops his hotel telephone handset into the rubber cups of his modem. Once the telephone connection to Tymnet is made, Frank retrieves the messages that were left overnight in his electronic "mailbox." By using the modem to access that information from his office computer, Frank can also place orders, check inventory, and alter prices and delivery schedules at any hour.

* * *

This article was written on a personal computer in Sunnyvale, Calif., and was transmitted by means of a modem to the *Personal Computing* editorial offices in Rochelle Park, N.J. There it was edited on personal computers and sent to the typesetting minicomputer. Such use of modems by publishers has substantially reduced the man-hours of labor otherwise required to get an article to press.

What is a modem?

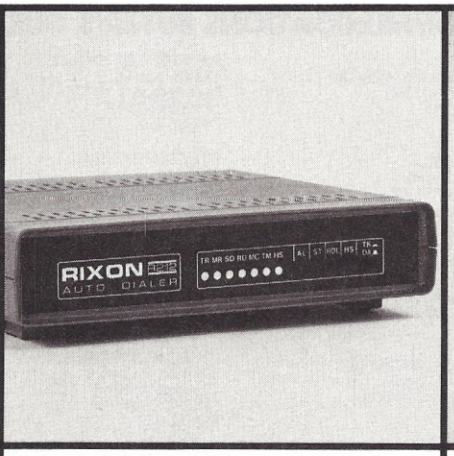
Despite their utility, modems often remain the "other" peripheral that a personal-computer user may consider only long after buying the disk drives, the printer, and a few hundred dollars' worth of gizmos. A modem, however, is a device that will allow you to link your computer into a growing network of information utilities and to communicate with many individual users.

"Modem" is a shorthand term for MOdulator/DEModulator. The modem modulates the data from your personal computer to convert it into a signal that can be transmitted over telephone lines or cable television lines. A modem at the other end demodulates or reconverts the signal back into a form compatible with a personal computer. Why do you need to go through this process at all? Because the electronic heritage of the telephone lines differs from that of the computers, and renders them otherwise incompatible.

A telephone is an analog device. Analog circuits respond to signals that vary smoothly and continuously. The telephone's handset receives your voice—the pattern of sound vibrations you create in the air. It faithfully converts those vibrations into an electrical signal that varies in the same analog pattern of frequency and intensity as your voice. The telephone



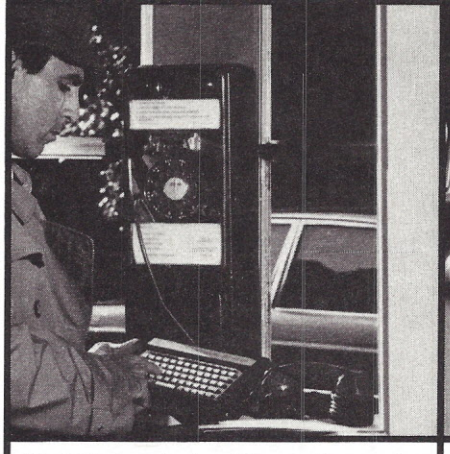
The cups on the top of this Tek-Com modem constitute the acoustic coupler.



Indicator lights on the Rixon R212 modem show the communications status.



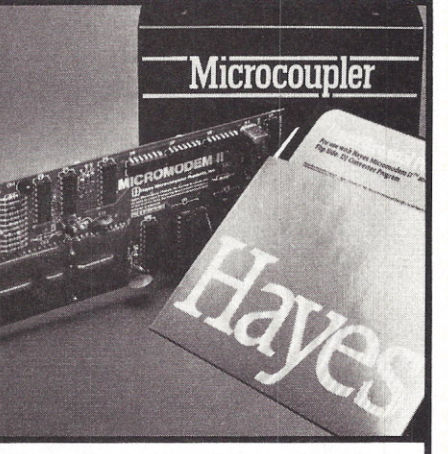
The ComData modem is housed in an enclosure that looks like a phone.



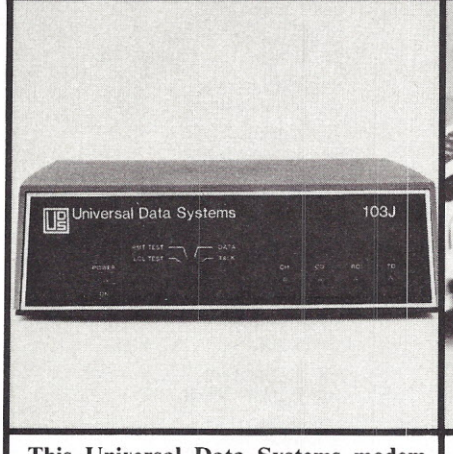
Portable terminals with acoustic coupler and modem put your data on the road.



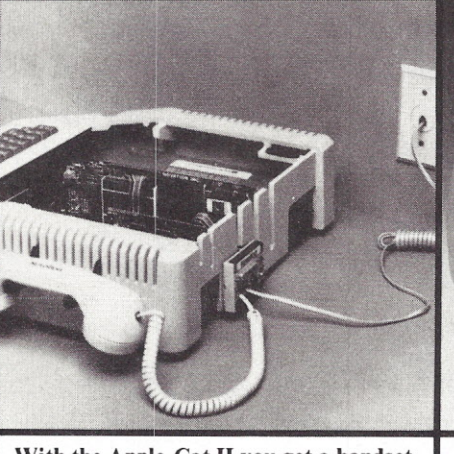
The Auto Link 300 connects to the phone line at the telephone instrument.



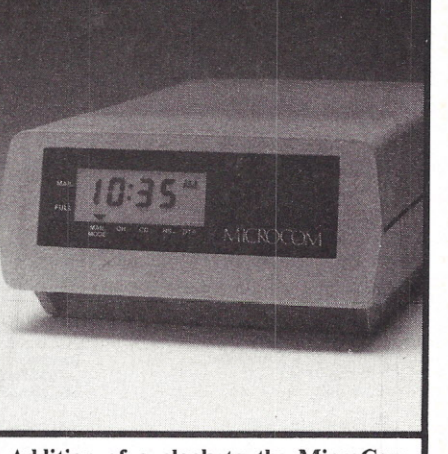
No matter what modem you have, communications software is necessary.



This Universal Data Systems modem allows you to switch functions.



With the Apple-Cat II you get a handset you can hang on the computer.



Addition of a clock to the MicroCom modem allows electronic mail.

COMMUNICATIONS BUYER'S GUIDE

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CIRCLE 349

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CIRCLE 350

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CIRCLE 351

Data-communications software is crucial and must be considered at the same time you consider the modem. Compatibility comes first.

line transmits that signal to the receiving telephone. The farther the signal travels through the line, the more it is subject to fading and distortion. Amplifiers and filters in the telephone network boost the signal strength and clarity for long-distance connections. When the receiving telephone picks up the signal, the other handset converts the electrical signal back into sound vibrations in the air so that the other person can hear your voice.

A computer, on the other hand, is a digital device. Digital circuits recognize only two electrical states: on and off, or high and low, or one and zero. Everything the computer does is processed by logical manipulation of the stream of binary ones and zeros. Computer signals are not modulated, but are switched. If you enter the pronoun "I" into a computer, it does not store an electrical analog of the soundwaves you make by saying "I." Instead, it stores a sequence of on/off binary "bits" of data that have been arbitrarily agreed upon as symbolizing the word "I." Such a grouping of bits sufficient to define a character or symbol is a byte.

Trying to plug your computer's digital output directly into an analog phone line would be as useful as sticking the lead wire into your ear. The computer's digital output would be inherently unintelligible. Also, the signal would be too fast and too weak, helpless to defend itself against fading and distortion over long distance. And last, if messages were being sent both ways simultaneously, the messages traveling in both directions would interfere with one another and the computers at both ends would receive garbage.

A modem is a translator. It takes a computer's digital output and converts it into an analog signal that a telephone line can handle. Digital "on" signals become pulses at one frequency; "off" signals become pulses at a different frequency. "Marker" pulses are inserted into the data flow to mark the beginning and end of each byte. Signals are sent from your modem at one pair of frequencies. Signals are received from the other modem at a different pair of frequencies so that the messages do not interfere with each other along the way. Each modem demodulates the incoming analog signals, converting them back into a digital data stream that your computer can handle.

Modems can work with ordinary voice-grade phone lines identical to those you customarily use. These phone lines have just enough bandwidth, or frequency range, to carry signals on four different frequencies at once. Voice-grade lines enable two personal computers to each send and receive information via modems.

Bell and baud

The first modems available to the public came solely from AT&T, whose monopoly was recently overturned by several Supreme Court decisions. Now modems can be sold by anyone whose equipment follows protocols specified by the Federal Communications Commission. They are mutually agreed-upon communications procedures and standards. Protocols might be compared to traffic laws in ordinary life—orderly procedures for efficiently getting from one place to another.

Most telephone companies won't sell you a modem, but they will lease you one. The most popular modems rent for between $25 and $50 per month. Private companies sell comparable modems for between $100 and $300, so most users would amortize the purchase price within a year. If you are considering getting a non-Bell modem, you should first ask which Bell-model protocols it will match.

Most modems used in personal computing fit protocols of the Bell-103 series of modems. Such modems have a top speed of 300 baud—that is, 300 bits per second. The speed of 300 baud translates to 30 characters per second, or about 300 words per minute. Actual transmission speeds are often slower than this theoretical top speed—especially if you're using error-checking software.

Many modems compatible with the Bell-103 series can run at lower baud rates as well, especially at the teletype speed of 110 baud. The general trend in newer modem technology is toward higher speeds, as one might expect. Over the next few years, 1200-baud transmission should become as common as 300-baud transmission is now.

Duplex, half and full

Modems are duplex devices, which means they transmit information in both directions. But they may or may not be able to "listen" and "talk" at the same time. Modems capable of full-duplex mode can transmit a message and receive an incoming message simultaneously, just as two people can talk at once on the phone. Modems operating in half-duplex mode must take turns sending and receiving, as people alternately talk and listen via a CB radio. In half-duplex transmission, the modems handle the turn-taking automatically, flashing "Can I transmit?" and "Transmit now" signals to each other in fractions of a second.

Half-duplex mode demands less of the telephone network, because at any moment each modem has to discriminate between signals on only two frequencies instead of four, and the network can transmit two frequencies more easily than it can transmit four. But full-duplex mode works faster overall. Moreover, full-duplex mode allows the sender to see an "echo" of what actually reached the receiver, instead of just showing what was sent. Versatile Bell-103-class modems have a switch that allows the device to work in both modes: full-duplex when possible, half-duplex for poor telephone line conditions or where the other modem can run only in half-duplex.

In addition to the duplex modes, versatile modems can operate in another pair of modes: the originate and answer modes. In the originate mode, the modem transmits its ones and zeros on the two lower frequencies available on a phone line. In the answer mode, the modem uses the two higher frequencies. It doesn't matter which pair of frequencies your modem uses, as long as the modem at the other end uses the opposite pair. You may have to flip a switch on the modem to set it to the right mode, or it may switch automatically, depending on the pair of frequencies it receives from the other modem.

Bell-113-series modems are originate-only or answer-only designs. Modems advertised as Bell-103/113-compatible are thus no more versatile than those claimed to be just 103-compatible, since the 113's capabilities are a subset of the 103's capabilities. When shopping for your modem, look for one that can choose between the originate and answer modes without human intervention.

Timing the signals

All the Bell modems share one thing in common: They transmit their data asynchronously—that is, their transmission timing is not synchronized. Each character the modem transmits is bracketed by start and stop bits. These bits tell the receiving modem where a given character starts and stops in the stream of data being sent. Thus you can enter data at your keyboard and it will go out at whatever pace you type it.

Large computers, on the other hand, usually communicate with one another synchronously. Here the two modems synchronize their watches, so to speak. Then the transmitting modem sends the data in large packets. The receiving modem separates the packets into characters based on the exact timing of the transmission. Synchronous transmission is faster, more demanding, and less flexible than asynchronous transmission. It is used where the high cost of the special equipment needed to send the data synchronously will be offset by the need to move floods of time-sensitive data at high speed—1200 baud or faster. Hardware and software for synchronous transmission of data is just starting to show up in the world of personal computing as well.

Connecting the modem

Regardless of transmission modes, your modem must be physically connected to the phone lines in order to allow your computer to communicate with the outside world. There are two ways to connect the modems: acoustically or directly. Acoustic modems demand that the telephone's handset be firmly placed into rubber cups on the modem. Direct-connect modems bypass the handset connecting into the telephone lines directly, either through the telephone jack on the wall or at the handset jack on the telephone itself.

With acoustic modems the user dials the telephone numbers by hand. When he wants to transmit data he flips on the voice/data switch. Making connections with an acoustically connected modem is straightforward. But it can be tedious when you must dial a long series of numbers to log onto a service such as Sprint, MCI, or The Source. Acoustic modems generally lack provisions for unattended operation.

In addition, acoustic designs are vulnerable to room noise and to the low fidelity of the handset. But an acoustic modem is portable, and it will work in an office, hotel room, or phone booth where a direct-connect modem requiring a specific type of jack may be useless.

Acoustic modems range up to a 1200-baud model from Racal Vadic. Most models suited to personal computers cost between $100 and $200.

Direct-connect modems are supplanting acoustic designs for many uses. Using a direct electrical connection, they provide a less noisy link to the phone lines. Simple models still require the user to dial calls manually, then switch to data mode.

"Intelligent" modems

Elaborate "intelligent" modems offer truly automated communications. If operated by a computer using appropriate software, intelligent modems can automatically dial a number or go through a log-on procedure stored in the computer. Intelligent modems can answer the phone, even if no one is present, and let someone use the computer from a remote site. If the computer or the modem is fitted with an internal clock, some modems can be programmed to go on at a specific hour, place calls, transmit and receive messages, and generally give the user timely electronic-mail service at the lowest night rates. Such modems can even be configured to print out messages as they are received, while also storing them in the computer's memory or on disk. Microcom and Creative Logic, among others, now make stand-alone intelligent modems; the Creative Logic modem can access a Corvus hard-disk system.

The fanciest intelligent modems offer other conveniences. Their front panels may have a variety of indicator lights to show their transmission rates, the status of the phone line, and other information. Some have an internal speaker so you know if a number was busy. With simple direct-connect units you may have no way to tell why a call didn't go through. Many have self-test provisions for easy troubleshooting. New designs have most of the circuitry on a single integrated circuit inside the modem. The single chip makes for lower prices, smaller size, and enhanced reliability. Some modems can be upgraded from 300 baud now, to 1200-baud capability later; Novation and Ven-Tel make upgradable models.

Various direct-connect modems

Make sure you can connect the modem you want to the computer you have.

differ in the details of their operation. Auto-dial capability may be by dial-pulse and/or touch-tone signal. Touch-tone dialing is faster, but will work only with a touch-tone phone line. Auto-redial (for redialing a number if it is busy) and auto-disconnect (for disconnecting the modem after the transmission is complete) may be offered by hardware and/or software: Either way is handy. Some modems have a BREAK key, to interrupt a transmission without breaking the connection.

Where do you put the modem?

Whether acoustic or direct-connect, modems come in many different configurations. Some are built into telephone handsets or computers. Some can be retrofitted to some computers. Others sit beside the computer or under the phone. Even if a dedicated phone line is installed just for the modem, some modems provide a separate handset that hooks on the computer simply for voice communication. Of course, where you choose to put the modem depends in part on the type of phone system you already have.

The modem is usually connected to the personal computer through an external RS-232-C port. A port is an outlet that is best thought of as a communications gateway for signals to and from the computer; many printers also plug into RS-232-C ports. If the computer lacks such a port, one can usually be added by means of a printed circuit board plugged into an internal expansion slot inside the computer.

The protocol for the RS-232-C port specifies which pin on the connecting plug controls which function. But the protocol is not consistent from one make of computer to another. Check to be sure that your modem and your computer port are "plug-and pin-compatible," and that connecting cables are guaranteed to work with the equipment you have.

If your computer has just one RS-232-C port and you have two RS-232-C devices (say, a printer and a modem), you can select one of three choices: add a serial port, buy a port-switcher, or connect one of the peripherals to the computer some other way. Ports can be added in series by means of an additional interface circuit board or a multifunction card that includes an RS-232-C port. Such cards generally cost between $100 and $500.

Port-switchers connect a computer's RS-232-C port to two outlets; the desired outlet is selected by flipping a switch. Port-switchers cost $80 and up. Port-switchers save the trouble and wear inherent in plugging and unplugging peripherals. Some modems can be plugged into alternate sites, such as an Apple II's input/output port for a game.

Some computers use a port that is incompatible with some modems. One example is the IEEE-488 port found on many Commodores. Make sure you can connect the modem you want to the computer you have, and that your plans include the cost and availability of the appropriate cable connection.

High-speed modems

High-speed 1200-baud modems plug into computers and telephone lines just like the lower-speed modems. For high-speed modems, two main Bell Telephone protocols exist: Bell-202 and Bell-212A designs. Bell-202 models are half duplex. Bell-212A models are full duplex and can run in synchronous mode as well as in the normal asynchronous mode. Some inexpensive models cost as little as $250 and run at 1200 baud only. Users wanting to take advantage of lower as well as higher speeds should get full-featured 0-to-1200-baud units. For such units you should expect to pay more than $500, especially if you want to be able to run in both full-duplex and half-duplex modes.

High speed modems cost much more than low-speed modems because sending data over voice-grade lines at high speeds is a tricky proposition, requiring a different and more expensive technology.

At its best, a 1200-baud modem runs four times as fast as a 300-baud unit. As with 300-baud transmission, however, noisy phone lines and procedures for detecting errors and resending data can slow the actual transmission speed. The complex protocols used by 1200-baud modems work most efficiently with large-volume data exchanges.

High-speed-modem users often circumvent phone-line problems by transmitting data over communication networks such as Tymshare's OnTyme service. OnTyme alleviates long-distance connection problems by making the connections through local numbers linked through high-quality, data-grade phone lines. The networks provide a message-storing service, too, reducing the need to dedicate a personal computer in the receiving office to electronic mail. Access to such networks costs around $200 a month per business, plus charges for connect time, long messages, and storage. The same services, by the way, can handle 300-baud transmissions as well.

Modem software

Thus far we have seen what modem hardware makes possible. But without software, all you can do with most modems is call or answer a number and view data. You can't capture or send information. You may not even be able to make a connection if you're calling a mainframe computer that requires a complex protocol. Data communications software is therefore crucial, and must be considered when you consider the modem.

There is a large variety of specialized communications software. Some programs let a personal computer

(continued on page 171)
(chart begins on the next page)

Data Communications Hardware

COMPANY/ PRODUCT	COMPUTERS IT WORKS WITH	TYPE Acoustic	Direct-connect	CALLING MODE Originate-answer	Originate only	Auto-answer	Answer only	Combination	PHONE TRANSMISSION COMPATIBILITY 103	113	212	212A
ANDERSON JACOBSON INC. A242A (acoustic coupler)	RS 232 interface	●			●				●	●		
ATARI Communicator II Kit (incl. 835 modem and TeleLink II; replaces 830, 850, TeleLink I)	Atari computers (no interface needed)		●		●				●			
BIZCOMP CORP. Bizcomp 1012 1200/300 Intelligent Modem	115 Vac wall transformer (supplied)		●			●		●	●		●	
Bizcomp 1022 Personal Computer Intelligent Modem	designed for computer rather than data terminal equipment		●			●		●	●			
Bizcomp 1031 Professional Terminal Intelligent Modem	115 Vac wall transformer (supplied)		●			●		●	●	●		
Bizcomp 1080	Commodore, Atari, Apple, others		●		●				●	●		
CERMETEK MICRO ELECTRONICS Smart Cable Dialmate 820	Uses Cermetek single ACPU integrated circuit for its functions		●	N/A					SCC part 68 registered			
Datamate 103 (modem)	RS232-C		●		●				●	●		
Automatic Call Processing Unit	RS232-C Standard terminal interface		●	●					801			
COMDATA CORP. 370E2-12 Phonem	RS232 interface		●		●				●	●	●	●
370E2-42 Phonem	RS232 interface		●		●	●			●	●	●	●
305E2-12 Modem	RS232 interface		●		●				●	●	●	●
305E2-22 Modem	RS232 interface		●				●		●	●	●	●
P212A Modem	RS232 interface		●		●	●				●		●
302 Acoustic Coupler	RS232 interface	●			●				●	●	●	●
COMMODORE COMPUTER VIC MODEM	VIC-20 and Commodore 64		●	●					●			
AutoVic	VIC-20 and Commodore 64		●	●		●			●			
CREATIVE LOGIC Datrix	Corvus network-compatible computers	N/A		●		●			non-applicable			
DIALOG INFO. SERVICE Knowledge Index	Serial interface and modem EIA RS232C (separate unit)	●	●	asynchronous					●			●

Modems often remain the "other" peripheral, to consider only after buying the disk drives, the printer, and a few hundred dollars' worth of gizmos.

202	Combination	SOFTWARE PROVIDED	DUPLEX Full	Half	Both	RATE OF DATA TRANSMISSION 110 baud	300 baud	1200 baud	Other	SPECIAL FEATURES	PRICE
					●				●	quartz crystal-controlled circuits	$295
		TeleLink cartridge			●		●			auto-log-on, scrolling memory buffer, simultaneous print, auto-dial	$279.95
			●			●		●		auto-dial, auto-redial	$695
		Streamlines	●			●				self-test, auto-dial auto-redial	$249
			●			●	●			same	$395
			●				●				$139
			●			●	●	●		auto-dial auto-redial	$249
			●				●			self-test auto-dial	$295
							●	●		self-test auto-dial auto-redial	$50
					●	●	●			dial access (push-button); automatic activation of exclusion key	$277
					●	●	●			same	$337
					●	●	●			voice/data switch; two-color LED indicator	$147
					●	●	●			same	$147
			●			●	●	●		self-test, analog, remote, digital loopback	$695
					●	●	●			loopback switch	$177
		VICTERM I	●		●	●	●				$109.95
		TERM 64			●		●			self-test auto-dial	under $180
		written in Z-80 machine code; can send max. of 16 modem transactions in 24-hr period			●	●	●	●	●	self-test, auto-dial, auto-redial, print schooler, mask capability prints banner pages	$795
		N/A			●		●	●			$35 initiation fee $25/hr

(continued on page 108)

TO ALL THOSE PEOPLE WHO ALREADY BOUGHT A PERSONAL BUSINESS COMPUTER.

"All that in one unit?"

"You mean it's portable without compromising on power?"

"A 16-bit processor?"

"And a built-in printer, too?"



DOT is a trademark of Computer Devices, Inc.

*DOT specifications: MS/DOS° operating system; 16-bit 8088 processor; optional Z80 CPU to implement CP/M2.2; 256K memory on single board, expandable to 704K; dual 3½" floppy disks with 287K (formatted) each; built-in 160 CPS printer, with 80 or 132 characters/line and graphics capability; easy-to-read 5" x 9" monitor with bit-map graphics (1024 x 256) and complete range of character display capabilities; asynchronous and IBM communications; optional 300 or 300/1200 baud integrated modem.

°MS/DOS is a trademark of Microsoft Corporation.

IT'S A SHAME YOU HAD TO RUSH INTO IT.

Introducing DOT™, the portable, personal computer that's about to simplify your business world.

Just imagine.

A totally integrated*, powerful, personal computer. One that's so small you can put it on your desk, or take anywhere you go.

There's nothing else like it.

What's more, it's easy to use. Even for people who don't know computers.

And for all its power and functionality, it costs a lot less than you'd expect.

Now imagine what DOT can do for you personally.

To put it simply, DOT will give you tremendous control.

You'll be able to examine your problems, analyze them, and solve them faster than you ever could before.

Because for one thing, there's a wide range of applications software, enough to easily answer your individual needs. Whatever they are.

And you can use DOT to access all sorts of outside data sources. Plus, if your company has a mainframe computer, you can access all its data, as well.

So you can get hold of virtually all the information you'll ever need. Fast.

And believe it or not, even though DOT is such a compact unit, it has a built-in printer that allows you to print both text and graphics.

Or if you like, you can display them on the unit's high-resolution screen.

Furthermore, to get you started as quickly as possible, there's plenty of easy-to-follow documentation.

Frankly, we've thought of everything.

Power. Portability. Plus printer and low price.

In a word, performance.

Not long ago, when people were rushing out to buy personal business computers, the thought of all this in one unit was hard to even imagine.

Now it's reality.

DOT.

So if you're one of the people fortunate enough to have waited, get the word on DOT. Call our toll-free number, 1-800-DOT-WORD, or return the coupon for information on DOT or for the Sales Office or Authorized Distributor nearest you. And learn the whole story on DOT, the powerful, professional workstation that really means business.



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THREE NEW PERSONAL COMPUTERS THAT MAKE ALL THE OTHERS MERELY INTERESTING HISTORY.

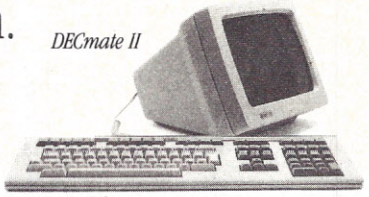
There was a time in recent history when people could tolerate the inadequacies of personal computers. We believe that era has ended.



Pro 300 Series

The minicomputer of personal computers.

Now you can own personal computers that are more powerful, easier to use and more fully supported than any to have come before them. They are the new personal computers from Digital Equipment Corporation, the world's second largest computer manufacturer.



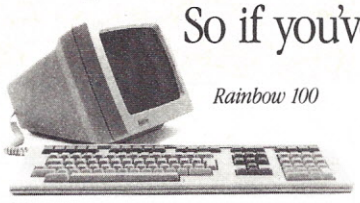
DECmate II

The fully supported small business system.

Digital's personal computers give you more information on the screen. More storage. And communications options that let you talk to other, larger computers anywhere in the world.

When it comes to graphics, you no longer have to settle for the "paint-by-numbers" look of yesterday's systems. Digital's optional bit-map graphics give you four times the resolution of even the very best picture tube. And you no longer have to settle for the pale, bland colors of the past. Digital's personal computers give you a wider palette to pick from.

Even more, you no longer have to be content with a narrow choice of personal computers. For Digital gives you three choices: Rainbow, DECmate, and Professional personal computers. Different kinds of personal computers, because there are different kinds of problems to manage.



Rainbow 100

The low cost high performance machine.

So if you've been unhappy with the history of personal computing thus far, be glad. A new generation has begun. To find out more, call 800-DIGITAL and we'll send you our free personal computer brochure. Or write: Digital Equipment Corporation, 129 Parker St., Maynard, MA 01754.

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digital

MORE PERSONAL. MORE COMPUTER.

(continued from page 103)

DATA COMMUNICATIONS HARDWARE

COMPANY/ PRODUCT	COMPUTERS IT WORKS WITH	TYPE Acoustic	Direct-connect	CALLING MODE Originate-answer	Originate only	Auto-answer	Answer only	Combination	PHONE TRANSMISSION COMPATIBILITY 103	113	212	212A
GENENERAL DATACOM INDUSTRIES GDC 103J-L	All personal computers EIA RS232C		●		●		●		●	●		●
GDC 103J-M	same		●		●	●	●		●	●		●
HAYES MICROCOMPUTER PRODUCTS Micromodem 100®	S-100 Bus computers		●	●		●			●			
Micromodem II™	Apple II, II Plus		●	●		●			●			
Smartmodem 300	RS232C computers		●	●		●			●			
Smartmodem 1200	RS232C computers		●	●		●			●			●
LEXICON CORP. Lex-11 Modem	RS232C interface	●			●		●		103A			
Lex-12 Modem	RS232C interface	●	●		●		●		103A			
Lex-21	none required—built-in modem	●	●		●		●		103A			
Lex-31	same	●	●		●		●		103A			
MFJ ENTERPRISES INC. MFJ-1232 Acoustic Coupler Modem	Any computer with RS232 or TTL/CMOS inputs/outputs; plugs into game port of Apple II, with MFJ-1231 software	●		●				●	●			
MICROCOM PCS/1200 (Professional Communications System)	EIA RS232 interface		●	●	●	●	●	●				●
PCS/300	same		●	●	●	●	●	●	●			
RX/1200	same		●	●	●	●	●	●				●
RX/300	same		●	●	●	●	●	●	●			
MULTITECH SYSTEMS INC. MT212A-Autodial	Any RS232-compatible machine		●		●	●			●	●		●
NOVATION INC. CAT	RS232 interface	●						●	●			
D-CAT	same		●					●	Bell 100 series			
AutoCAT	Direct-connect per FCC part 68		●				●	●	Bell 100 series			
212 Auto-CAT	same, plus EIA RS232C		●					●	Bell 100 series			

Modems may or may not be able to "listen" and "talk" at the same time.

202	Combination	SOFTWARE PROVIDED	DUPLEX Full	Half	Both	RATE OF DATA TRANSMISSION 110 baud	300 baud	1200 baud	Other	SPECIAL FEATURES	PRICE
			●			●	●			self-diagnostics with Analoop	$199.95
			●			●	●			same plus digital loopback; optional terminal control of call answering and disconnect	$249.95
		Micromodem 100 Terminal Software	●			●	●		●	auto-dial	$399
		Micromodem II Terminal Program	●			●	●			auto-dial	$409 (includes software)
			●			●	●		●	self-test, auto-dial, audio monitor	$289
			●			●	●	●	●	same	$699
					●	●	●		●	self-test	$159.95
		not required			●	●	●		●	self-test	$199.95
		same			●	●	●		●	self-test, non-volatile RAM, built-in modem	$995
		same			●	●	●		●	same plus 4-function chaining calculator with memory, extended 37-pin microprocessor bus connector, break key, perpetual calendar, clock with alarm	$995
		optional terminal software, MFJ-1232			●	●	●			cassette input/output ports; battery operation; TTL/CMOS and RS232 inputs/outputs	$129.95
					●		●	●	●	self-test, auto-dial, auto-redial, others	$995
					●		●	●	●	same	$595
					●		●	●	●	same	$895
					●		●	●	●	same	$595
		Firm-Ware, for automatic dialing			●	●	●	●		self-test, auto-dial, auto-redial	$750
			●	●			●			self-test, auto-dial, auto-redial	$189
			●	●			●			self-test, auto-dial	$199
			●	●			●			self-test, auto-dial, auto-redial	$249
			●				●	●		self-test, auto-dial, auto-disconnect	$695

(continued)

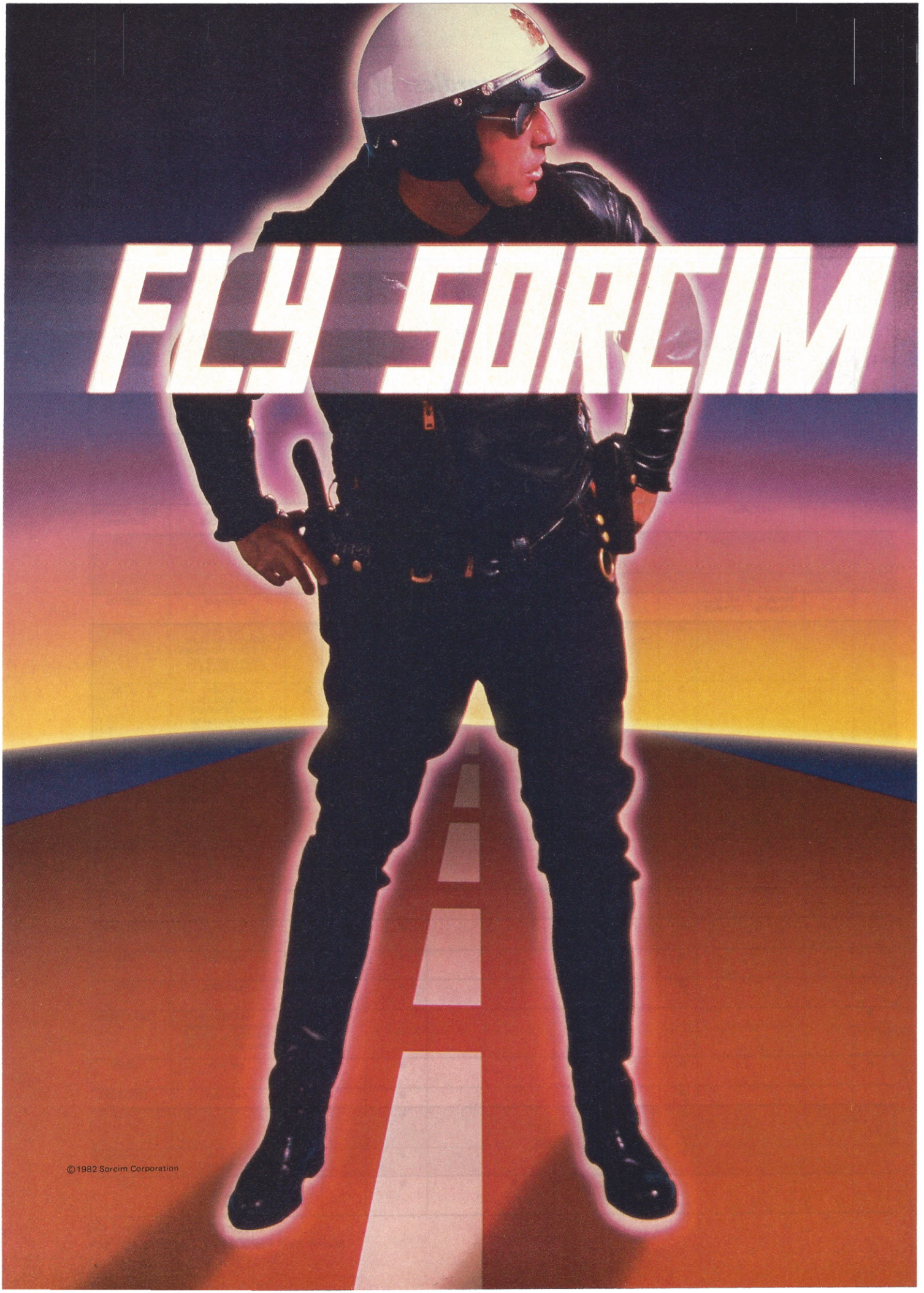
DATA COMMUNICATIONS HARDWARE

COMPANY/ PRODUCT	COMPUTERS IT WORKS WITH	TYPE Acoustic	Direct-connect	CALLING MODE Originate-answer	Originate only	Auto-answer	Answer only	Combination	PHONE TRANSMISSION COMPATIBILITY 103	113	212	212A
Apple-CAT II	Direct connect per FCC part 68, FCC Reg. No. AU 492 X-69442-Ringer Equivalence 0.8B, DP-E		●					●	Bell 100 series			●
OSBORNE Comm-PAC	O-1		●					●			●	
PANASONIC CO. The Link-RLH 1400 (4k)	This is a computer—use with RLT 4001 acoustic coupler	●		●					●			
The Link-RLH 1800 (8k)	same	●		●					●			
PMMI COMMUNICATIONS MM-103 card	S-100 computers		●			●		●	●			
PRENTICE CORP. P212	RS232C interfaces		●		●	●	●		●	●	●	
212 Terminal-controlled modem	same		●		●	●	●		●	●	●	
Star 103	same	●			●		●		●	●	●	
RACAL VADIC VA4840 (Bell 208 replacement)	RS232C interface		●	●					Bell 208			
VA 4400 Quad Modem	VA 3400 mode VA 4400 mode		●	●					●			●
VA 3450 Triple Modem	RS232C interface		●	●					●			●
VA 3413/12 Acoustic Coupler	VA 3400 mode	●			●				●	●		
VA 212LC (Bell 212A replacement)	RS232C interface		●	●								●
VA 212PA (Bell 212A replacement)	same		●	●								●
VA 1250/55 (Bell 202 replacement)	same		●									
VA 355 (Bell 103 replacement)	same		●	●					●	●		
VA 103 Modemphone			●	●		●			●	●		
RADIO SHACK-TANDY CORP. TRS-80 Direct Connect Modem I	Any RS232C-equipped TRS-80		●	●					●			
TRS Direct Connect Modem II	same		●	●		●			●			
RCA CORP. VP 3501 (Telecommunications Terminal)	Asychronous ASCII		●		●				●			

Regardless of transmission modes, your modem must be physically connected to the phone lines to allow your computer to communicate.

202	Combination	SOFTWARE PROVIDED	DUPLEX Full	Half	Both	RATE OF DATA TRANSMISSION 110 baud	300 baud	1200 baud	Other	SPECIAL FEATURES	PRICE
•			•	•			•	•		self-test, auto-dial, auto-redial	$389
		AMCALL			•		•			auto-dial auto-redial	$265 (includes software)
		Telecomputing II			•	•	•				$380
		same			•	•	•				$480
		Modem 7, MCALL, CrossTalk, COMMX			•	•	•			auto-dial	$359.95
			•	•		•	•	•	•	self-test delayed busy-out, 10 status indicators, stand-alone or rack-mount	$650
			•	•		•	•	•	•	auto-dial, redial, auto-retry, alternate number dialing, optional pseudo-echoplex, stored commands and options, voice-call origination, others	$795
			•	•		•	•	•	•		$199
				•					•	self-test, analog and digital loopback	$1350
			•				•	•	•	compatible with multiple automatic calling system (MACS)	$1945
			•				•	•		auto-dial	$875
			•				•	•			$795, $895
			•				•	•		auto-dial	$550
			•				•	•		auto-dial	$795
•				•				•		VA1255 has reversed channel; VA1250 is without reversed channel	$425, $525
•			•				•			self-test	$375
			•				•			auto-dial	$250-$380
			•				•		•		$149
			•			•	•			auto-dial auto-disconnect	not available
					•		•			color graphics, RF output to standard TV	$399

(continued on page 114)


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SuperData-File Manager
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(continued from page 111)

DATA COMMUNICATIONS HARDWARE

COMPANY/ PRODUCT	COMPUTERS IT WORKS WITH	TYPE Acoustic	Direct-connect	CALLING MODE Originate-answer	Originate only	Auto-answer	Answer only	Combination	PHONE TRANSMISSION COMPATIBILITY 103	113	212	212A
VP 3801 (Personal Commun. Terminal)	same		●	●		●			●			
RIXON INC. R103J	Any RS232 interface		●	●		●		●	●	●	●	
PC 1200	same		●	●		●		●	●	●	●	
R212A	same		●	●		●		●	●	●	●	
SSM MICROCOMPUTER PRODUCTS Apple Modem Card	Apple II		●			●	●	●	●	●		
Modem-1200	Any RS232 serial interface		●			●						●
TEK-COM TC 2122	RS232		●		●	●			●			●
TC 2124	same		●		●	●			●			●
TC 3001	RS232 or 20Ma	●			●				103F	113A		
TC 3002	same	●		●					103F	113A		
TC 3006	RS232	●			●				103F	113A		
TC 3008	20 Ma current loop, CCITT V24/28	●			●				European CCITT			
TC 3009	same	●		●					European CCITT			
TC 3012	TTL Interface; Teletype 43 compatible	●			●							
TC 4700	RS232 or 20Ma		●		●	●			103J	113B		
TC 5100	RS232 CCITT V24/28	leased line										
TELEVIDEO SYSTEMS INC. CDI/ET2 Intelligent Modem	TeleVideo TS 800, TS 802/H, TS 803 systems		●	●		●			●			
TNW CORPORATION Operator Automatic Calling Unit	Any RS232 ASCII terminal or computer											
TNW-103 IEEE-488 Modem	Any IEEE-488 bus computer		●					●	●			
Operator-103 Modem	Any RS232 ASCII terminal or computer		●					●	●			

Acoustic modems generally lack provisions for unattended operation.

202	Combination	SOFTWARE PROVIDED	DUPLEX Full	Half	Both	RATE OF DATA TRANSMISSION 110 baud	300 baud	1200 baud	Other	SPECIAL FEATURES	PRICE
					●		●			auto-dial, auto log-on, 80- and 40-character displays	$399
			●			●	●		●	front panel talk/data switch	$199
			●			●	●	●	●	front panel talk/data switch	$499
			●			●	●	●	●	front panel talk/data switch built-in auto-dialer	$895
		Transend or Transpak with Source subscription offer			●	●	●			audio feedback through Apple speaker	$299
		Transend or Transpak with Source sub-scription offer			●		●	●		auto-dial, self-test	$695
			●				●	●		self-test	$595
			●				●	●		self-test, auto-dial, auto-redial	$795
					●		●				$249
					●		●				$265
					●		●				$195
					●		●				$325
					●		●				$365
					●		●				$195
					●		●				$365
●			●	●				●			$385
●	●	TeleVideo's TeleAsync	●	●			●	●		when used with TeleAsync: auto-dial, auto log-on, time-delayed trans-mission, mail logging, phone directory, error detection, auto retransmission, bulletin board	$795 (including TeleAsync III)
		not needed			●	●	●		●	adds auto-dial and auto-answer capabilities to acoustic couplers	$129
		terminal program for Commodores			●	●	●		●	self-test, auto-dial, auto-answer	$548
		any simple terminal program			●	●	●		●	auto-dial, auto-answer	$189

(continued)

DATA COMMUNICATIONS HARDWARE

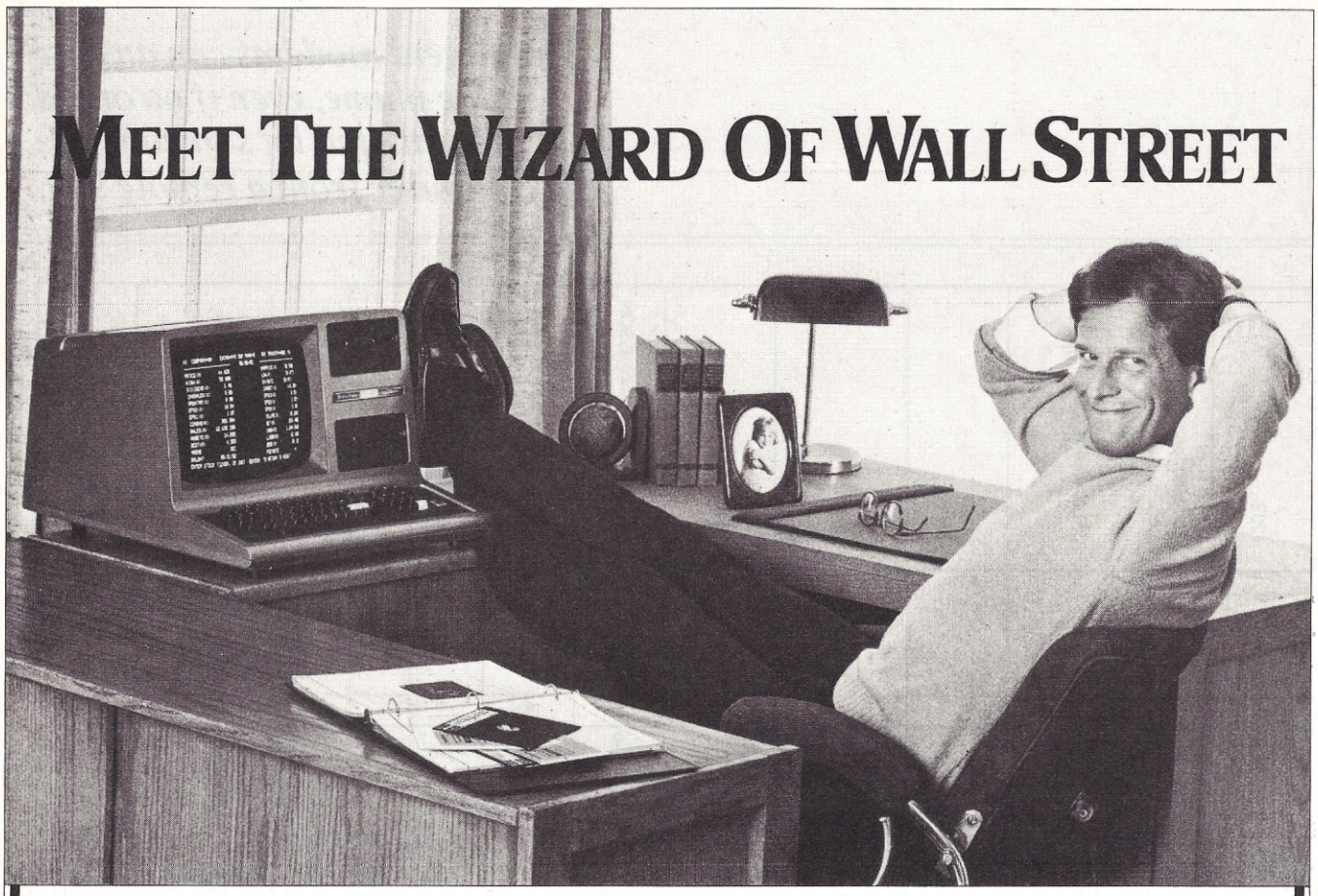
COMPANY/ PRODUCT	COMPUTERS IT WORKS WITH	TYPE Acoustic	Direct-connect	CALLING MODE Originate-answer	Originate only	Auto-answer	Answer only	Combination	PHONE TRANSMISSION COMPATIBILITY 103	113	212	212A
TRI-DATA OZ 215 (word-processing message station)	Any computer with RS232 interface		●					●				●
OZ 225 (network modem)	same		●					●				●
UNIVERSAL DATA SYSTEMS UDS 103LP O/A	same		●	●					●	●		
UDS 103JLP	RS232C		●			●			●	●		
UDS 103J	same		●			●			●	●		
UDS 202LP	same		●	●								
UDS 202SLP	same		●			●						
UDS 212LP	same		●	●								●
UDS 212A	same		●			●			●	●		●
UDS 202S	same		●			●						
UDS 212A/D	same		●			●			●	●		●
U.S. ROBOTICS INC. Phone Link	RS232	●		●					●	●		
Little Link	same		●	●					●	●		
Micro Link	same		●	●					●	●		
Auto Link	same		●	●		●		●	●	●		
Micro Link 1200	same		●	●							●	●
Auto Link 1200	same		●	●		●		●			●	●
Auto Link 212A	same		●	●		●		●	●	●	●	●
Auto Dial 212A	same		●	●		●		●	●	●	●	●
VEN-TEL INC. PC Modem Plus	IBM Personal Computer—works with PC-DOS and/or CP/M-86		●		●	●		●	●	●		●
Model MD201-3	EIA/RS232C interface		●		●	●			201 A, B, C			

Intelligent modems can answer the phone, even if no one is present, and let someone use the computer from a remote site.

202	Combination	SOFTWARE PROVIDED	DUPLEX Full	Half	Both	RATE OF DATA TRANSMISSION 110 baud	300 baud	1200 baud	Other	SPECIAL FEATURES	PRICE
			●			●	●	●		self-test, auto-dial, auto-redial, connection control, security provisions, auto log-on, dialing directory	$2970
			●			●	●	●		same	$1475
			●			●	●		●	operates on telephone line current—no AC power needed; alternate voice/ data switch	$195
			●			●	●		●	same	$245
			●			●	●		●	local and remote test capability; alternate, talk/ data switch	$425
●				●		●	●	●	●	telephone line powered—no AC necessary; alternate talk/ data switch	$245
●				●		●	●	●	●	same	$295
			●					●		same	$495
			●			●	●	●	●	end-to-end self-test; analog, digital, and remote digital loopback	$695
●					●	●	●	●	●	local and remote self-test; analog loopback	$475
			●			●	●	●	●	auto-dial; analog, digital, remote digital loopback; end-to-end self-test; auto-dialer	$795
		not needed			●	●	●			self-test	$149
		same	●			●	●				$139
		same			●	●	●			self-test	$179
		same			●	●	●			self-test	$219
		same			●			●		self-test	$449
		same			●			●		self-test	$499
		same			●	●	●	●		self-test	$549
		●			●	●	●	●		self-test, auto-dial, auto-redial	$599
		complete communications software for log-on, file transfer, data capture; menu driven with help messages	●	●		●	●	●		self-test, auto-dial, auto-redial; 2k memory on modem buffers incoming data	N/A
			●	●					●	local diagnostic and remote test capabilities	$605

(continued on page 122)

MEET THE WIZARD OF WALL STREET



Standard & Poor's STOCKPAK system can turn any investor into a whiz

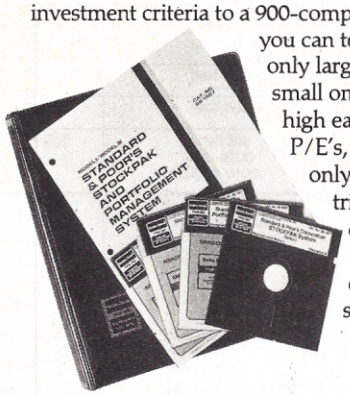
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In fact, you can draw from over 200 specific information items to compose a single screen. And, you can establish your own targets and cut-off points in each of these 200 areas. STOCKPAK will oblige by searching through the entire database to find only those companies that satisfy your criteria.

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STOCKPAK is designed exclusively for use on the TRS-80 Models III and I computers with 32K business systems and two disk drives. The basic software and sample database plus complete documentation is available from your Radio Shack computer store for only $49.95. The STOCKPAK monthly updating service can be ordered directly from Standard & Poor's for only $200 annually. Visit your local Radio Shack today for additional information and a demonstration.

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CIRCLE 30

GOOD NEWS



Have you put aside buying a color monitor because it's too expensive?
But, have you looked at the new TAXAN RGBvision color monitor?
Would you be excited at a suggested retail price of $399.00 for the RGBvision I, and $599 for the RGBvision II?





DO WE HAVE GOOD NEWS FOR YOU!

For those low prices, you can have:

- ☑ Full compatibility with Apple III and IBM PC without interface modules
- ☑ Compatible with Apple II through the TAXAN "RGB-II" card
- ☑ RGBvision I medium resolution - 380(H) lines
- ☑ RGBvision II high resolution - 510(H) lines
- ☑ Unlimited colors through linear amplifier video circuit and 16 colors for Apple III and IBM PC
- ☑ 12-inch, 90° deflection CRT display

Can you really afford to turn all that down without looking at the TAXAN RGBvision monitors? See your local dealer for a demonstration.



TAXAN 12" green phosphor monitor, model KG12N, features an 800 line resolution at center, 2000 character display.

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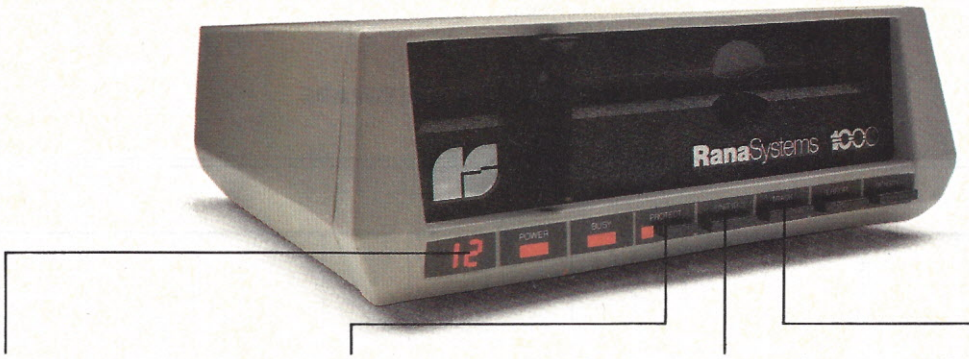
CIRCLE 53

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We just made owning an Atari computer a lot more logical.



Introducing the Rana 1000 disk drive. It's a whole new game for Atari computers.



This two digit LED readout displays a code that tells you everything you need to know.

This beeping button tells you your write protect feature is keeping your information safe.

The remaining buttons beep when touched, and provide readouts on density storage, error status, and drive number.

This button beeps when you touch it, and the LED readout tells you what track you're on.

When Rana Systems introduced the Elite Series of Apple® compatible disk drives, we didn't know what a tremendous impact they would make. It turned out to be a line so outstanding in performance, styling, capacity, and price, that it instantaneously made us a major force in the market. Well, needless to say, the response was so great that we were forced to create the same highly advanced disk drive for Atari.® A disk drive that when coupled with Atari's computer, could perform everything from accounting, financial planning, and stock charting, to word processing, business management, and letting you write your own programs. Plus, we made it simple enough for a child to use, for learning anything from the alphabet to a foreign language.

Working with a diskette versus playing with a cassette.

Let's face it. The only reason Atari made a cassette option to their computer was to make it affordable. But now you don't have to settle for less. Because now you can get a diskette for your Atari computer which outperforms their cassette and costs ⅓ less than their disk drive. With Atari's cassette you only get half the functions of a computer compared to what our floppy disk can give you. Their cassette is not only limited in the software available, but it also takes 20 times longer to get the information you need. And Rana's disk drive offers twice the storage capacity of either their cassette or disk drive.

Why even stylewise our new low profile design not only looks 100 times more spectacular, but it occupies 3 times less space. And our new Rana 1000 also gives you a piece of its mind every time you use it, because our disk drive gives you information as well as takes it. And we think that says a lot.

The disk drive that has all the answers.

Rana offers you a myriad of features Atari couldn't even conceive of. Like five electronic functions on the front panel that actually beep and give you a LED readout when touched. Our disk drive tells you what track you're on, and what density and how much information you're storing. It lets you switch from a single density of 90,000 letters to a double density of 180,000 letters, on a single diskette. And, we have a write protect feature which protects your diskette from being erased. In fact, no other disk drive can offer you that.

As you can see, it was easy to build a disk drive superior to Atari's. Because for every reason you buy a disk drive, Rana has superior technology.

The Rana 1000 disk drive. It brings your Atari computer to a higher level of sophistication for a price one third lower than Atari's. So your choice shouldn't even be a matter of logic.

Just common sense.

RanaSystems *Always a step ahead of the originals.*

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(continued from page 117)

DATA COMMUNICATIONS HARDWARE

COMPANY/ PRODUCT	COMPUTERS IT WORKS WITH	TYPE Acoustic	Direct-connect	CALLING MODE Originate-answer	Originate only	Auto-answer	Answer only	Combination	PHONE TRANSMISSION COMPATIBILITY 103	113	212	212A
Model MD201-1	same		●		●	●	●		same			
Model MD103J-3	Digital interface—EIA/RS232C; phone line interface—RJ11C, RJ41S, RJ45S		●		●	●			●	●		●
Model 202-2	EIA/RS232C interface		●		●	●						
Model 202-6	same		●		●	●						
Model MD113-33	same		●			●			●	●		
Model MD212-1	Digital interface-EIA/RS232C; phone line interface—RJ11A, RJ41S, RJ45S		●		●	●			●	●		●
Model MD212-1E	same		●		●	●	●		●	●		●
Model 212 Plus	same		●		●	●			●	●		●
Model 212 Plus II	same		●		●	●			●	●		●
Model AC 103-1 Acoustic Telephone Coupler	Interface RS232C and 20 Ma	●			●				●	●		
Model AC 103-3 Acoustic Telephone Coupler	same	●		●					●	●		
Model SLD Synchronous Line Dirver	EIA/RS232C interface		●		●		●					
Model ALD-4 Asynchronous Line Driver	same		●		●		●					

Voice-grade lines enable two personal computers to each send and receive information via modems.

202	Combination	SOFTWARE PROVIDED	DUPLEX Full	Half	Both	RATE OF DATA TRANSMISSION 110 baud	300 baud	1200 baud	Other	SPECIAL FEATURES	PRICE
				●					●	same; card usable in rack mount	$730
			●	●		●	●			auto-dial, stored number dial, battery supported memory, auto-redial, network addressing, others	$554
●				●				●		local diagnostics; remote test capabilities	$380
●			●	●				●	●	same	$350
			●	●			●			remote test capability, busy-out manual, computer controlled	$300
			●				●	●			$850
			●				●	●		integral voice/data switch, no telephone required, card usable in rack mount chassis	$550
			●				●	●		auto-dial, instant redial, number linking, stored number dialing, others	$795
			●				●	●		programmable dialer; system and network log-on procedures; constant line monitoring; self-test, analog, digital, remote digital loop test capabilities; others	$998
			●	●		●	●				$245
			●	●		●	●				$270
			●					●	●	local and remote test features	$450
			●	●					●	analog and digital test features, built-in redundant ALD	$320

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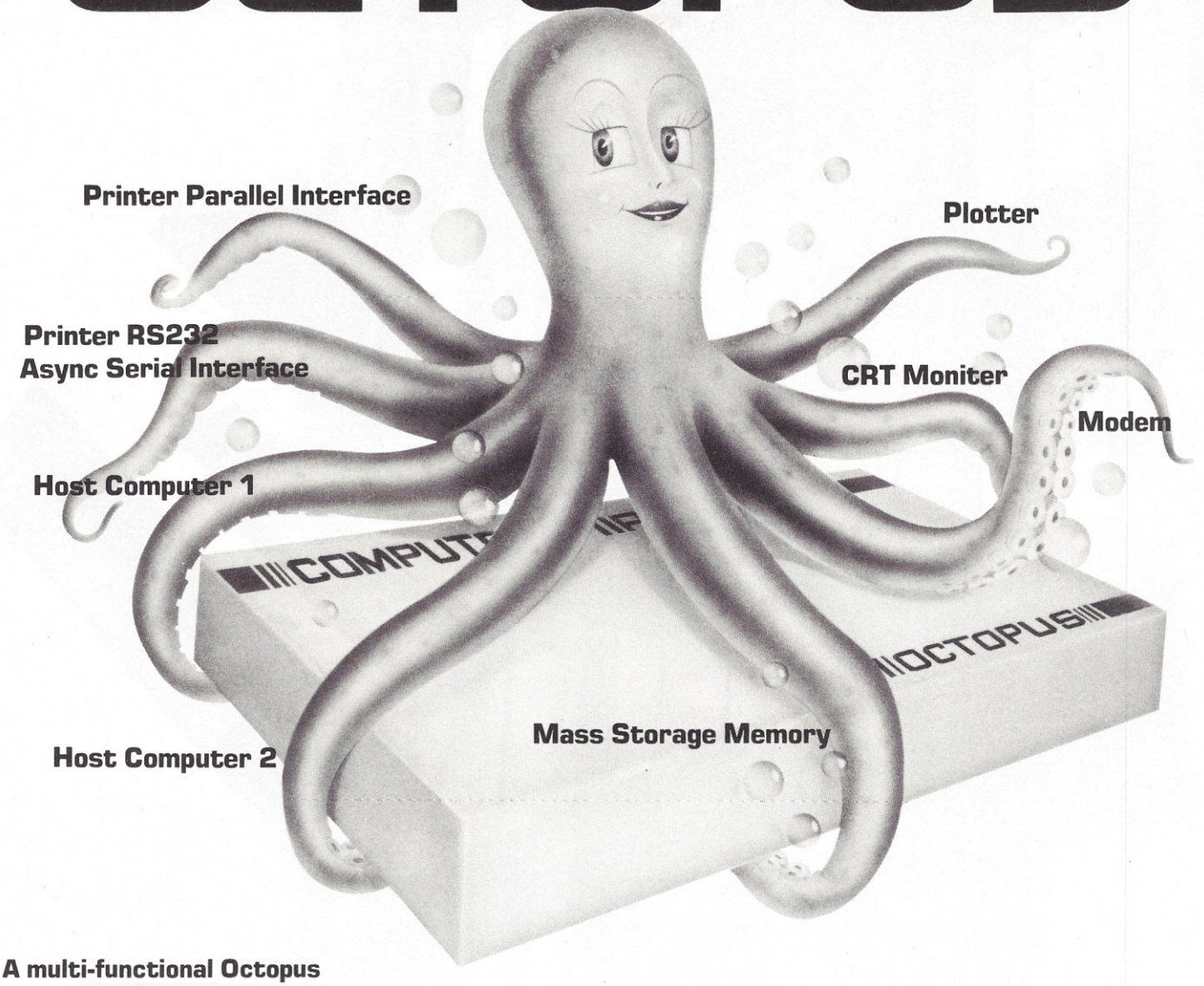
Data Communications Software

COMPANY/ PRODUCT	COMPUTERS, MODEMS, SYSTEMS IT RUNS ON	MENU DRIVEN	MAXIMUM SIZE FILE TRANSMITTED	VERIFIED TRANSMISSION MODE	DATA TRANSMISSION RATE SUPPORTED 110	300	1200	Other	INCLUDES AUTOMATIC LOG-ON PROCEDURE	EDITING FUNCTIONS	PRICE
ABT MICROCOMPUTER SOFTWARE Data * Trans	Micromodem II, Smartmodem, SSM A10 & A10 II Cards, Apple Commun. Card, Videx Videoterm 80-column board	●	†			●	●		●		$100
ADVENTURE INTERNATIONAL Combat	TRS-80 Model I, III—32k; Atari—24k; Apple—48k		*	*	●	●	●	●			$49.95
ALPHA SOFTWARE CORP. The Apple-IBM Connection	Apple II-one disk, 64k—DC Hayes Micro-modem II or Mountain Computer CPS card; IBM Personal Computer —one disk, 64k, RS232		†	●		●			Communicates with people using electronic mail mode.		$195
APPLE COMPUTER Comm-Pac	48k Apple II Plus Micromodem II	●	140k			●			●	line editor delete/insert lines	$85
Micro Courier III	128k or 256k Apple III Hayes Smartmodem	●	†	Async. trans-mission	●	●	●		●	full screen editor	*
Access III	128k Apple III; All modems with RS 232 connection; SOS Operating System	●	†	●	●	●	●	●	●	Insert; delete; find; replace; store, save, mark text; transmit marked text; save data on disk, load from disk, word wrap, tab & margin set	$150
ATARI Telelink II Cartridge	Atari		N/A			●	●		●		included with Communicator II Kit
COMMODORE COMPUTERS VICTERM 40	VIC-20	●	†	●	●	●				standard functions	$39.95
COMPUSERVE VIDTEX	Apple II, II Plus—Hayes Micromodem or Apple comm. card and modem, 32k, DOS 3.2, 3.3 TRS-80 Models I, III—32k, RS232 interface, modem TRS-80 Model II—32k, modem	●	†	●		●	●	●	●		$19.95-$39.95
CONTEXT MANAGEMENT SYSTEMS, Context MBA Release 2.0 (Integrated package incl. word-processing, file mgt, commun., graphics, and spreadsheet)	IBM Personal Computer with MBA, 256 k RAM, Hayes Micromodem or Acoustic Coupler	●	†			●	●			●	$695
DOW JONES SOFTWARE Dow Jones Connector	Any personal computer with word-processing capability	N/A	N/A	N/A		●	●			N/A	$95 (incl. contract, documentation, membership)
HAYES MICROCOMPUTER PRODUCTS Smartcom II (IBM)	IBM Personal Computer 96k RAM, 1 disk drive, MSDOS v 1.1 Smartmodem 300 or 1200	●	†	●	●	●	●		●	create, delete, print, send, receive, display, rename	$119
Smartcom II (Xerox 820-II)	Xerox 820-II Smartmodem 300 or 1200, two 8-inch disk drives	●	†	●	●	●	●		●	same	$119
Hayes Terminal Program	Apple II, Micromodem II, DOS 3.3, Pascal, CP/M, 48k	●	†	●	●	●	●			same	$99
LEXICON Lex-21	Lex Operating System		2K	parity error detected	●	●			●	complete word processing	$995

†-limited by disk capacity; * -not available; N/A-not applicable

(continued)

OCTOPUS



A multi-functional Octopus

It's a printer buffer, a printer spooler, frees computer time and enables copying capability.

A data protocol translator:
parallel to parallel parallel to serial
serial to parallel serial to serial

A multitask data channel controller:
- enables host computer to communicate to multiple peripherals simultaneously.
- enables multiple computers to communicate with multiple peripherals simultaneously.
- compatible to most interface protocols.

All in one for only $197.50.

Standard product includes: Z80 CPU
One parallel input port (centronic printer and IBM PC compatible), one parallel output port (centronic printer and IBM PC compatible), two Serial RS232 Asynchronous ports, 8KB resident memory.

Options include:
Up to 256KB upgradable memory
Graphic enhancements.
Modem with Auto Dial capability.
Two additional parallel ports
Two additional Serial RS232 Asynchronous ports.
Customized software enhancements.

computer peripherals

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CIRCLE 48

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How to keep the computer revolution from becoming a revolt.

Computers are creating a revolution in the way we work. But because they sometimes lose or confuse information, they also create frustrating problems.

But not all computer errors are the computer's fault. Sometimes, it's a faulty flexible disk. Because of surface inconsistencies, some disks can lose their magnetic properties. And along with them, your information.

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For your nearest Verbatim dealer, call toll-free 800-538-1793; in California or outside the U.S., call collect (408) 737-7771.

CIRCLE 49

(continued)

DATA COMMUNICATIONS SOFTWARE

COMPANY/ PRODUCT	COMPUTERS, MODEMS, SYSTEMS IT RUNS ON	MENU DRIVEN	MAXIMUM SIZE FILE TRANSMITTED	VERIFIED TRANSMISSION MODE	DATA TRANSMISSION RATE SUPPORTED 110	300	1200	Other	INCLUDES AUTOMATIC LOG-ON PROCEDURE	EDITING FUNCTIONS	PRICE
Lex-31	Lex Operating System		14k	same	●	●			●	same, plus file-management system	$995
LIFEBOAT ASSOCIATES ASCOM	CP/M 80, MSDOS, CP/M 86		†	●	●	●	●		●		$175
BSTAM	CP/M 80, CP/M 86		†	●	●	●	●				$150
BSTMS	CP/M	●	†		●	●	●		●		$150
RBTE-80	CP/M	●	†		●	●	●				$750
eZ MAIL	CP/M	†	†		●	●	●			●	$149
LINK SYSTEMS DataLink	Apple II—64k, Apple Pascal, Hayes Micro-modem, Novation Apple-Cat, CCS7710A or SSMAIO with external terminal	●	†	●	●	●	●	●	●		$99.95
DataLine	Apple III—128k, DCHayes Micromodem or external modem connected to serial port	●	†	●	●	●	●	●	●		$149.95
MFJ ENTERPRISES INC. MFJ-1231	Apple II Plus	●	†	●	●	●				●	$39.95
MICROCOM MICRO/Terminal	Apple II, III, IBM Personal computer	●	†			●	●	●	●	word processing	$84.95-$99.95
MICRO/Courier	IBM Personal Computer Apple III, Apple II, TRS-80 Model III	●	†	●		●				same	$150
MICROSTUF INC. CROSSTALK	32k min.—CP/M, MP/M DOS, CP/M 86 Bell 103, 212A-compatible modems		†	●	●	●	●	●	●	*	$195
MICRO-SYSTEMS SOFTWARE INC. MicroTerm (Smart Terminal Package)	TRS-80, Zenith Z-100, IBM Personal Computer	●	†	●	●	●	●	●	●		$79.95 up
MOUNTAIN COMPUTER INC. Communication Software System, Level I	Apple II, III; Atari 800; IBM Personal Computer; TRS-80 Models II, III; Osborne	●	†		●	●	●				$75
Communication Software System Level II	same	●	binary file transfer	●						error checking	$150
NOVATION Com-Ware II	Apple II, II Plus	●	*		●	●	●	●			included with Apple-Cat II modem
OSBORNE AMCALL	OCC-1, 64k	●	92k	●		●			●	●	$265 (incl. hardware)
PANASONIC CO. Telecomputing II	Panasonic RLH 1400, RLH 1800	●	8k		●	●					$39.95
PEACHTREE SOFTWARE Telecommunications	CP/M-based computers, MS-DOS, CP/M-86 (4/83)	●	†	●	●	●	●		●	links to word-processing package	$375
RADIO SHACK-TANDY CORP.	TRS-80 Models I, II, III; Apple II, II Plus		N/A			●					$29.95
SANYO SANYCOM	Sanyo computers	●	†			●	●		●	●	$105
SOFTWARE CONNECTIONS Mail Monitor (complete company elect. mail system)	Corvus Network or Hayes Smartmodem with Apple II for central post office; Apple II or Corvus Concept for local sites		†		●	●	●		N/A	standard plus letter form (electronic mail)	*

†-limited by disk capacity; * -not available; N/A-not applicable

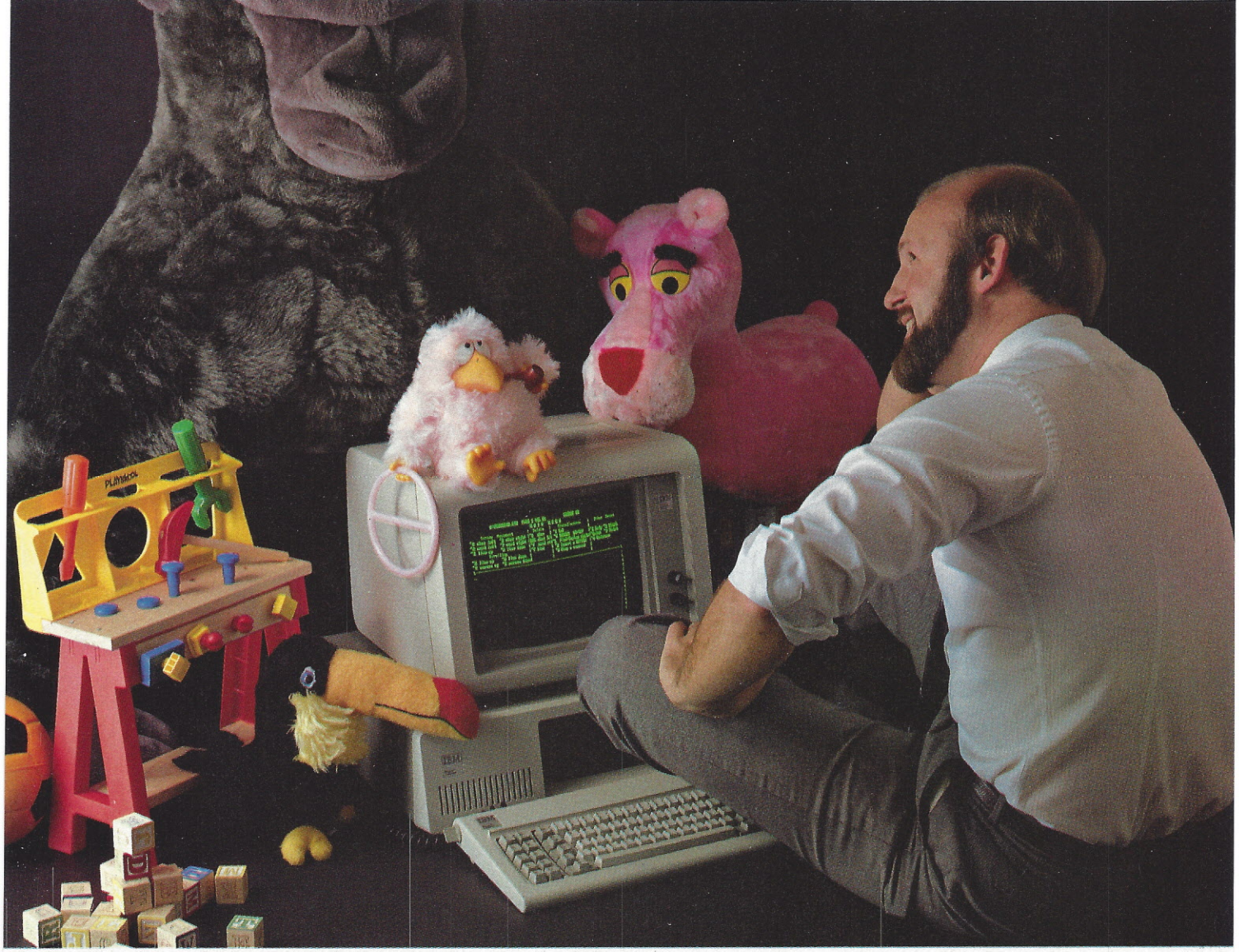
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COMPANY/ PRODUCT	COMPUTERS, MODEMS, SYSTEMS IT RUNS ON	MENU DRIVEN	MAXIMUM SIZE FILE TRANSMITTED	VERIFIED TRANSMISSION MODE	DATA TRANSMISSION RATE SUPPORTED 110	300	1200	Other	INCLUDES AUTOMATIC LOG-ON PROCEDURE	EDITING FUNCTIONS	PRICE
THE SOURCE The Source	Universally compatible	●	No maximums for average use	●		●	●			●	$100 registration; $5.75-$20.75/hour
SOUTHEASTERN SOFTWARE Data Capture/pc	IBM Personal Computer 64k	●	†		●	●	●	●		line editing	$120
Data Capture 4.0	Apple II with Apple comm. card	●	18k			●			●	line editing	$65
Data Capture 4.0/80	Apple II, Micromodem II, Super Serial Card; Prometheus Versacard, SSM and CCS serial cards	●	20k		●	●	●		●	limited	$90
SOUTHWESTERN DATA SYSTEMS Ascii Express-The Professional	Apple II, II Plus—48k; all modems, comm. cards, 80-column cards	●	†	●	●	●	●	●	●	full editing	$129.95
P Term-The Professional	same	●	†	●	●	●	●	●	●	use Pascal editor	$129.95
Z Term-The Professional	same	●	†	●	●	●	●	●	●	use CP/M editor or WordStar	$149.95
SSM MICROCOMPUTER PRODUCTS INC. Transend 1	Apple II, III; modems—Novation, AppleCat, Ven-Tel, Prentice, Bizcomp, UDS	●	†	●	●	●	●	●		●	$89
Transend 2	same	●	†	●	●	●	●	●		●	$149
Transend 3	same	●	†	●	●	●	●	●		●	$275
Transpak-1,2,3 (incl. Apple Modem Card)	same	●	†	●	●	●	●	●		●	*
SUPERSOFT Term II	Any CP/M-compatible system	●	†	●		●	●	●	●	standard functions	$200
TELEVIDEO TeleAsync	TeleVideo TS 802/H, TS 803, TS 800 with CP/M; 64k RAM	●	340k	●		●	●		●	add, edit, delete, list functions	$150
Tele3780-Remote Batch Emulator	TeleVideo TS 800, TS 802/H, TS 803—Z80-based; 64k RAM; CP/M	●	340k	●	●	●	●	●			$500
Tele3270-IBM 3270 Emulator	TeleVideo TS 800, TS 802/H, TS 803—Z80-based; 64k RAM; CP/M TeleVideo TS 806, TS 816 (cluster configuraton)	●	340k	●							*
TNW CORPORATION XPTERM	Commodore with disk and 16k RAM, plus either TNW-103 modem, TNW serial interface, or Commodore 8010 acoustic coupler.	●	†	●	●	●					$59
U.S. ROBOTICS INC. Compak	CP/M-based systems; Osborne; TeleVideo; North Star; 24 k min.	●	†	●	●	●	●				$49.95
VECTOR GRAPHIC INC. CONECT	Vector Graphic	●	†	●		●	●		●		$150
VISICORP VisiLink	Apple II—48k RAM, two disk drives, with DC Hayes Micromodem II, Novation Apple-Cat II, or 212 Apple-Cat II	●	One VisiCalc worksheet	●		●	●		●	can modify data requests	$250
WESTICO ASCOM	IBM Personal Computer, MS-DOS, CP/M-86, CP/M-80	●	†	●	●	●	●	●	●	standard functions	$175

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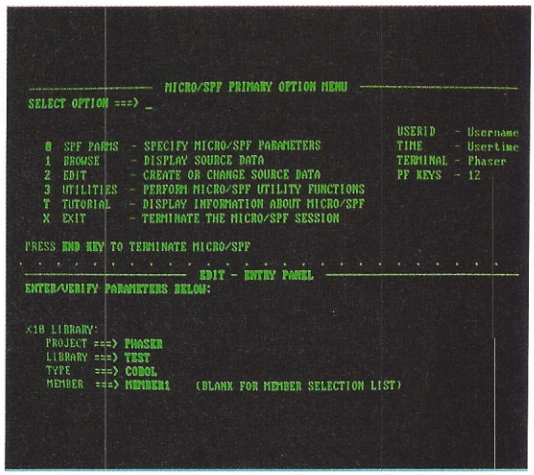
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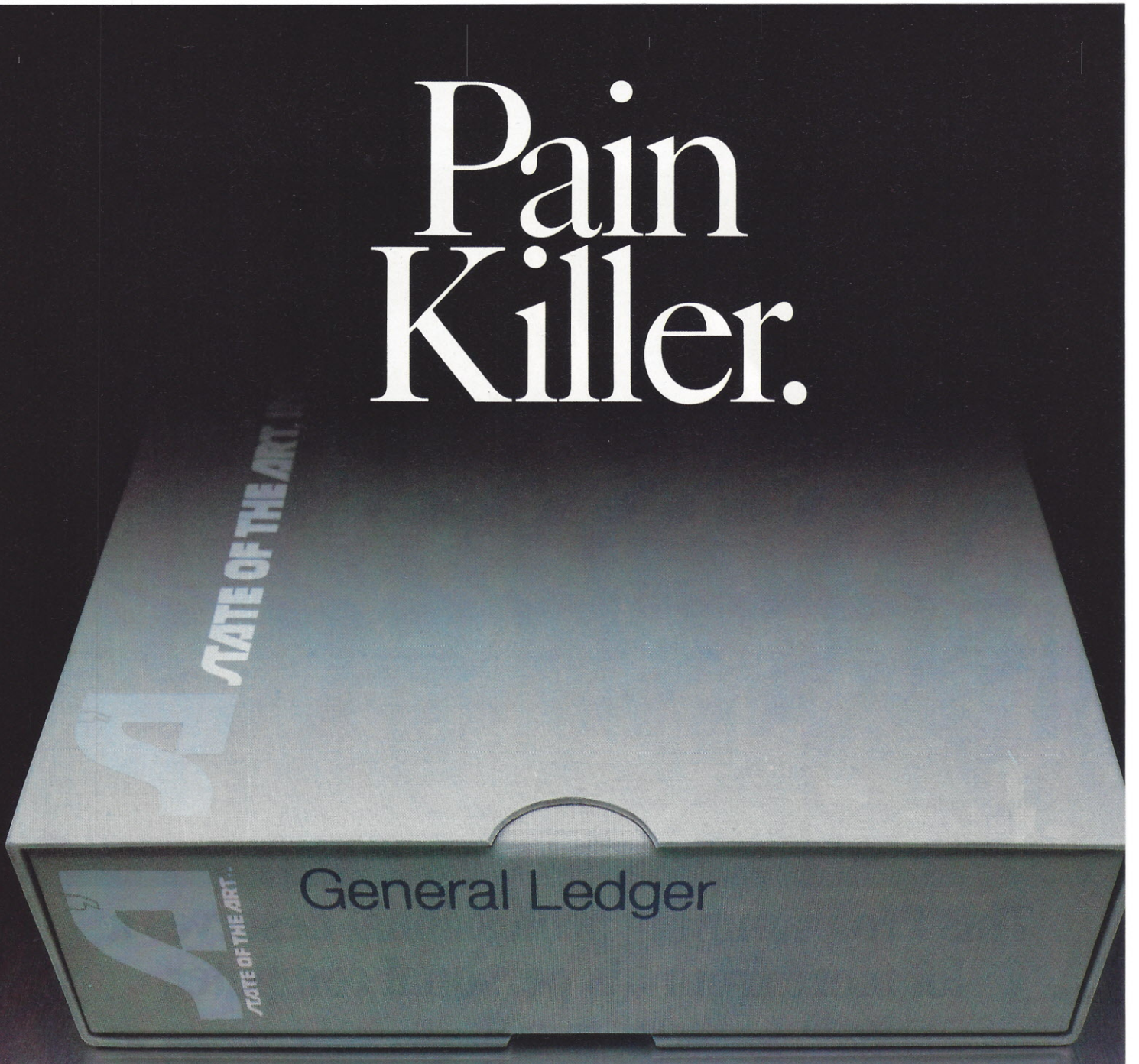
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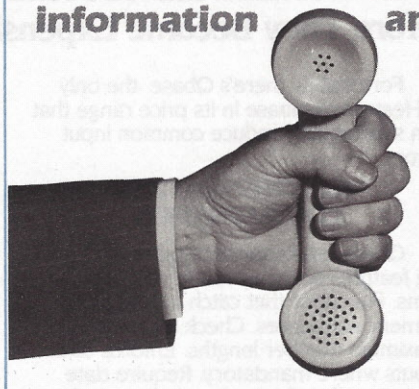
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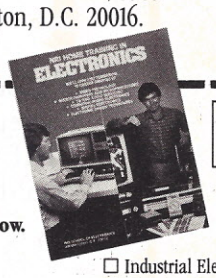
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CIRCLE 56

The Delightful Discovery Of A Career In Computing

Words may not be a writer's sole support—especially if he finds he has a talent for computing

by Ron Lichty

As a writer, author, and intended book publisher, I was ready to upgrade to top-of-the-line writing equipment in January 1980. I didn't know when I started looking for a high-quality typewriter that I'd leave tradition behind and buy a computer instead, nor did I realize that the process of buying and setting up a used business computer would lead me to an entirely new career as a personal-computer systems programmer. But that's precisely what happened. The transition took place gradually—yet irresistibly.

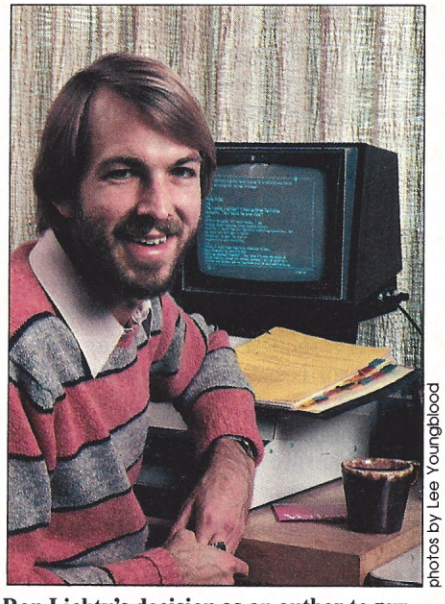
"Am I making a mistake?" I asked my friend Tom Crosley. "Am I buying the wrong thing?"

With an on-again off-again income, I was anxious about spending $1100—even for a top-of-the-line Selectric correcting typewriter. But my real worry was that what I actually needed was to make the leap to computerized word processing.

For advice, I had turned to Tom Crosley, a longtime friend who was also a highly regarded personal computer consultant and the author of the Apple PIE word-processing system, now PIE Writer. Tom told me that with his help in buying used equipment I should be able to put together a system for under $2500.

It didn't take long to discover how much I'd need expert assistance. My first issue of the Computer Shopper arrived early in February and I opened it with anticipation—only to be confronted with hundreds of ads filled with alphabet soup: ELF II giant bd., AM 100 2-board CPU set, AM 300 6 port RS-232-C I/O card, SSB BFD-68 Disk System, CT-1024, SOL-20, S-100 bus, SS50 Systems, 6800, 6502, 8080, Z80,. . . .

I called Tom, who aimed me at a computer like his—an SWTP 6800 and, for a printer, the Diablo Hytype I. Within a few hours I'd found all the possibilities. "Used Hytype I with case, $850" drew Tom's interest. So I bought it.



photos by Lee Youngblood

Ron Lichty's decision as an author to purchase a high-quality typewriter led to his becoming a computer programmer.

Now I owned a device that cost almost as much as the typewriter I'd originally wanted, yet was absolutely without the other device—a computer—to make it print. Worse, I was nearly ready to write. I had to find a computer fast.

On Tom's advice and my own intense desire to understand enough to buy what I needed, I attended the West Coast Computer Faire. It was absolutely amazing. There were two huge halls filled with equipment that I carefully avoided touching, afraid I'd break the programs inside.

It opened my eyes to the computer business and to what an incredible experience it must be to be part of the action.

I was altogether in awe of a third of the throng crowding those halls—the third which ranged in age from 10 to 15 and was totally unafraid to walk up to those computers and fiddle. What was really disconcerting was that they seemed to know what they were doing. There were even booths of kids who'd designed and were now selling their own software.

Suddenly I understood those stories about middle-aged executives afraid both of computers and of the youngsters who knew how to use them. If I hadn't already been committed to buying a computer, I might have given up on even that small step.

Ron Lichty is a free-lance software writer/programmer who lives in San Francisco, Calif.

The next month's Computer Shopper yielded a possible computer: "SWTPCO 12k with Microterm Act I Video/cherry keyboard system runs at 9600 baud/2 MPS/MPC/MPLA/ACT-33 interface for 2400 baud type. TC-3 interface and CFM-3 4800 baud tape file system. All TSC software & SWBASIC and Microsoft BASIC/Also 300 baud Univac Printer." The price was $850. And the seller lived about two hours away.

"Might be OK," Tom said. "4800 baud. That's almost as fast as disk. Tape's not as useful as disk but it's a good $500 cheaper."

I went to see the thing the next day. It was frightening. There was an intimidating black box with printed circuit boards inside and a pair of relays hanging off in places where they shouldn't have been, a tape deck out of the guy's stereo system, a slightly mangled standard portable tape recorder, a Sony TV with a video cable running through a connection on top, and a lightweight aluminum box with an electric-typewriter keyboard implanted in front and a couple of switches sticking through hand-drilled holes. This system was definitely on the homebrew side.

But I saw potential. Besides, this shopping phase was taking too much of my writing time—I needed to get my book underway. So I bought it.

When I took it into Tom's office later that week, I learned another word to add to my growing vocabulary of computer jargon. "What a kludge," he proclaimed, shaking his head. "What a kludge."

Tom worked for a week, and then presented me with my word-processing system. I struggled to understand Tom's explanations of what he'd done, explanations that went far beyond my field of experience and knowledge. It was the beginning of a thirst for computer literacy that would ultimately lead me to a new career.

Not every writer would have tried to understand, but it seemed important to me; and in part, it seemed a matter of survival. Being the first author in my circle of friends to turn to word processing, especially on a system acknowledged to be kludgy, smacked of adventure. Moreover, Tom's office was an hour away from mine.

But there was something more, something I've never quite been able to understand. I know that a majority of computer users are just users, people without the need to know more. That's fine. But I'd loved math and science in high school and college, had built electronic projects in my spare time during those years, and indeed had intended to become an electronics engineer when I went to college.

Still, had I bought my computer new, off the shelf, I wonder if I would have worked so hard at satisfying my curiosity. Was it my practical need to know that led me to the major career change I ultimately made?

Regardless, I now owned a computer and Tom was filled with congratulations for me, even though it was primarily his doing. For $2200, he told me, I had purchased, in my 20k SWTP computer, tape decks, monitor, keyboard, and letter-quality Hytype I—"more power per dollar" than anyone else he knew.

Curiosity strikes

I spent the first week or two with my new computer just learning to write into it and edit the words I'd written. The system was primitive, but primitive is a relative thing, and any word processor is better than even the best electric typewriter.

I was writing. My computer was remembering the lines of text I had begun to type into its memory and save out onto its cassette tapes. I was delighted by how easy it was to enter and save, edit, and modify my book. And such low-effort printouts! It needed me only for filling its memory with information and its carriage with sheets of paper. I was in writers' heaven.

But I wanted more. I yearned to know exactly what was taking place inside that box that made it respond to my commands.

Early on, I knew where software lived inside my computer. Tom had carefully noted the beginning and ending addresses on each of my program tapes, and each time I loaded a program or part of my book, my operating system told me where it had been put. But while I knew it was all in there, I didn't understand how.

My computer was just a month old in April when I started looking for answers. A friend, Marilou, was taking a course called "Introduction to Business Data Processing," and I pored through her textbook. The chapter on binary arithmetic and hexadecimal representation, on the CPU and on storage, proved especially helpful. It provided me with enough information to use my computer to discover more.

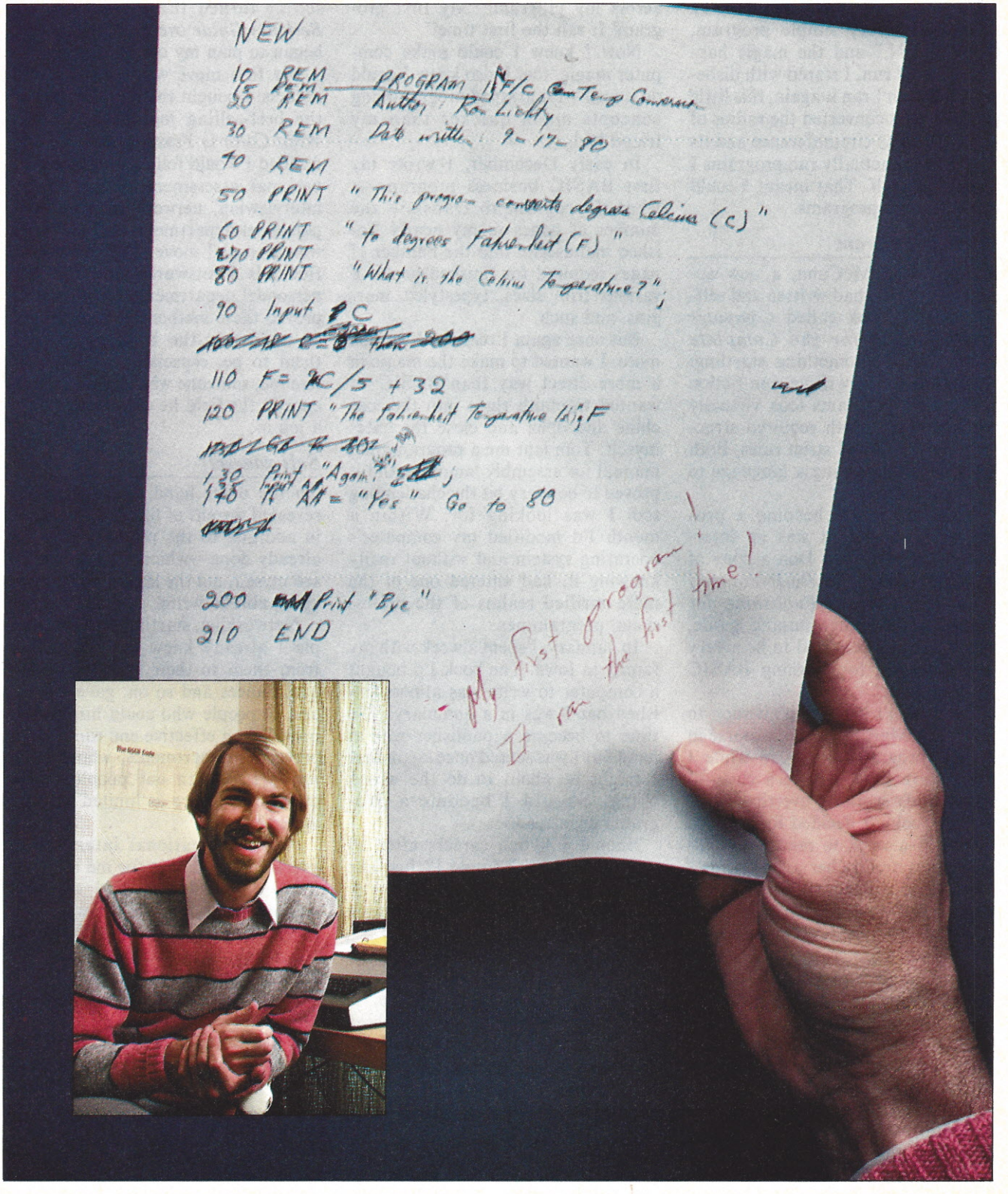
I'd had a problem with my editing program—there seemed to be phantom characters floating through my text. I couldn't see them but they were fouling my files. So, using my new tools, I played detective. Character by character, I compared the hex and ASCII representations of the contents of memory and discovered the phantom characters responsible. Tom, the expert programmer, was impressed.

In May, Marilou's computer course introduced her to BASIC programming. She showed me the sample program listed in the text.

"I wonder if you could run it on my computer," I mused aloud. I must have loaded SBASIC off tape a dozen times, typing words at it that I'd seen imbedded in its code to try to make it do something. All I'd gotten were error messages. Was this what you did with it?

This scrawled flowchart, which was the first BASIC program that Ron Lichty wrote, converts Celsius to Farenheit.

Now I knew I could make computer magic, too. I also knew I could do it well.



I was breathless as I entered the 11 lines of the very simple program, typed "RUN," and the magic happened. It did run. I stared with disbelief. And then I ran it again, this little program that converted the radius of a circle into its circumference and its area. I could actually run programs I typed in myself. That meant I could write my own programs.

My first program

In July, Don McCunn, a new acquaintance who had written and self-published a book called *Computer Programming for the Complete Idiot*, told me something startling: He claimed that writing non-fiction and writing programs took virtually the same skill. Both required structure. Both followed strict rules. Both involved manipulating a language to communicate.

A writer who'd become a programmer—now that was an interesting idea. I traded Don a copy of my first book, *The Do-It-Yourself Guide to Alternative Publishing*, for a copy of his programming guide, which I soon discovered to be a very useful tutorial for learning BASIC programming.

But I didn't get the motivation to start until Marilou began a course in BASIC programming. And while I didn't have time to take a class—I was already working overtime writing my book—I decided to set aside one night a week to read Marilou's class notes and do her assignments.

Her first assignment was to actually write a program. We sat across the table from each other and each hacked out a program which would ask for Celsius temperatures, convert them to Fahrenheit, and print the results. We were given the formula to use. Simple. Of course, it took us an hour to figure out how to say it in BASIC.

When I finished, I went to the computer with my hand-written program and typed and ran it. I was so excited with the result, I wrote in red across my program: "My first program! It ran the first time!"

Now I knew I could make computer magic, too. I also knew I could do it well—I'd grasped programming concepts much quicker than my friend had.

In early December, I wrote my first BASIC business program—a what-if program to translate the number of pages in my nearly finished manuscript into the number of pages required for finished books of various trim sizes, typestyles, margins, and such.

But once again I realized I wanted more. I wanted to make the magic in a more direct way than BASIC—I wanted to climb right into the machine and open and close the gates myself. Tom lent me a programming manual for assembly language and it proved to be every bit the challenging tool I was looking for. Within a month I'd modified my computer's operating system and without really knowing it, had entered one of the more rarified realms of the professional programmer.

In January, I spent a week with my family in Iowa. The book I'd bought a computer to write was almost finished but I was in a quandary: The time to become a publisher was at hand but I was scared once again that I might be about to do the wrong thing. Should I become a programmer instead?

Should I switch careers after 10 years as a writer? Could I? Just like that?

On the other hand, programming felt so right.

My dad provided the deciding factor with a simple observation: "Every letter you write to us," he told me, "is filled with excitement over something new you've done with a computer."

I realized he was right. I'd enjoyed it so much, in fact, that for months I'd spend all of my free time—evenings, weekends, even time I'd set aside for writing—to play with programs. In March I committed myself. I turned the manuscript for *Berkeley Guide* over to my agent and began to plan my career change.

My first move was pivotal to my success; I bought the latest edition of the best-selling job-hunting guide, *What Color is Your Parachute?* and decided I would follow its strategy of personal assessment, informational interviewing, network-building, and personnel-department avoidance. It was a crucial move. The few classified ads I answered and the few personnel departments I approached proved these methods to be every bit as useless as the book proclaimed them to be, especially for someone like me, someone who had no experience in the field he was trying to get a job in.

Sell yourself

On the other hand, self-assessment revealed dozens of life experiences—in addition to the programming I'd already done—which I could use to sell myself, not the least of which was being able to write.

Networking, starting with the people I already knew and expanding from them to their friends and acquaintances and so on, gave me access to people who could hire me. It provided an effective end run around personnel departments, whose main job is to screen out people whose qualifications are as limited as mine were then.

And informational interviewing provided the chance for me to get to know the industry and where I wanted to fit into it in a way non-threatening both to me—I had only to ask intelligent questions, not to sell myself—and to the other person who was not being asked to hire me but only to give advice.

I discovered that with little more than the name of someone they knew as an introduction, people would go out of their way to see me and to give me their advice. In fact, many seemed genuinely honored that I had asked them.

In the middle of a depression there's real comfort to be working in one of the only growth industries left.

I talked to scores of people in programming and the picture I was able to form of the Bay Area job market was a remarkably clear one. I found two distinct job markets: one for COBOL programmers to work for big corporations primarily in downtown San Francisco, and the other for personal-computer programmers to work for the myriad large and small companies located in Silicon Valley.

The need for programmers in both areas is so great that companies will pay "head hunters" large sums of money to send them qualified employees. Anyone with a year's experience in programming can get a new job virtually any time he wants.

That is, of course, the Catch-22—getting a company to give you that first year's experience.

Writing or programming?

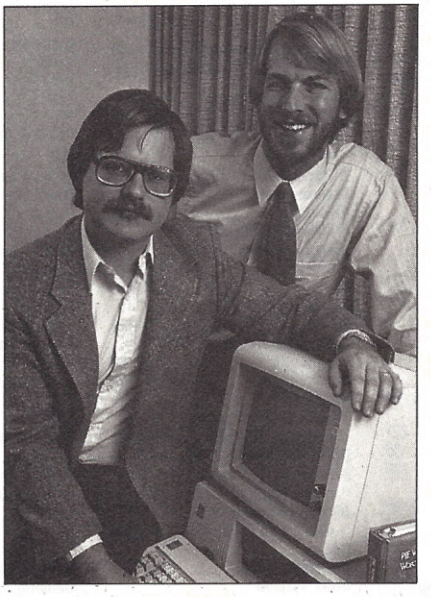
I spent a month gathering all my information. Some people pointed out that 80 percent of programs written for money are done in COBOL so I should take classes and learn that language. Others advised me to skip going back to school and instead find someone to hire me as is. And a majority told me I should forget programming and go after technical writing—programmers were a dime a dozen, but writers who could understand programs were very rare. In fact, several head hunters offered to present me as a tech writer to the companies they worked with.

Finally I came up with my priorities: first choice, programming personal computers, preferably in assembly language; second choice, technical writing, but only long enough to get my foot in the door; and absolutely no COBOL.

I spent the second month interviewing potential employers and, after much persistence, I was offered a job as a technical writer with a minicomputer company. The feeling of success was wonderful—but the job wasn't quite right. I held them off for a week and used the time to call other possible employers to say "Now or never." One of them was my old friend Tom who told me he'd asked the publishers of his PIE program if he could bring me on board to develop versions of PIE for other computers. The answer was yes, and so, just 14 months after buying a computer for word processing, I reported to work one Monday morning as an assembly-language programmer.

My first project was to translate 3000 lines of an assembly language I'd never seen—6502—into a high-level language I'd never heard of, SPL/M, using a disk operating system I'd only read about, and PIE, which I'd never had a chance to use. I survived.

Within six months I'd moved from writing applications in a high-level language to working on the language itself. Since then the 8088 and the 68000 microprocessors have brought to five the number of assembly languages I've learned. I've written an SPL/M code generator for the 8088, developed a few software tools, and taken on some of the design work and all of the coding for four applications programs—tools for writers and programmers—we'll be bringing to market this year.



Lichty with Tom Crosley, author of the Pie Writer word processor. Crosley led Lichty into higher levels of computing.

There were whole weeks during my first months on the job that I felt like I was drowning. The puzzles to solve seemed immense. But each time, when I finally surfaced, gasping for air, the high of solving the puzzle was utterly exhilarating. I knew there could be nothing better.

After a year and a half into the job I still sometimes feel like I'm drowning—but now it lasts only a day or two. And more important, I have few regrets about spending time writing programs instead of books.

In the middle of a depression there's real comfort to be working in one of the only growth industries left. The death knell for book publishing has been repeatedly sounded over the past few years and it's been tough times for those free-lance writers still in the business. But computers won't go away and neither will the growing demand for programmers, particularly ones with systems skills like those I've gained in the last few years.

Tough programming challenges give me the excitement of solving new puzzles daily. And even though the challenges are tough, the rules for communicating in a programming language are clearer, simpler, and far fewer than the rules for communicating in human languages.

Finally, there's one other bonus. Writing is judged by readers, first and last. Unfortunately, the number of letters I've received from readers fill a very small file. Think about it: When was the last time you wrote to an author to tell him about the chapters, or the sections, or even the nuances of a single paragraph that worked for you?

Programs are also judged by the people who use them. But programming is judged first by the computer. In BASIC, you just type "RUN" and you know instantly if you've got it. What more could a writer want?

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MMSII (Memory Management System)	50	37
Optimized Systems Software, Inc.		
Speed Read Plus	60	43
Peachtree		
Series 40 GL, AR, AP, Inventory, Payroll (ea)	400	239
Peach Pak (GL/AR/AP)	[5] 595	359
Penguin Software		
Complete Graphics System	70	50
Special Effects	40	30
Graphics Magician	60	45
Additional Fonts and Character Sets	20	15
Complete Graphics System II (Apple Tab Ver.)	120	86
Special Effects (Apple Tab Ver.)	70	50
Program Design, Inc.		
The New Step-by-Step	80	58
Quality Software		
GBS-DB Apple Dev. Prog.	700	504
Sensible Software		
Super Disk Copy III	30	23
Multi Disk Catalog III	25	19
Disk Recovery ("The Scanner")	30	23
Applesoft Plus Structured BASIC	25	19
Disk Organizer II	30	23
DOS Plus	25	19
Quickloader	25	19
Image Printer-Letter Quality	40	30
Image Printer-Epson	40	30
Image Printer-NEC Dot Matrix	40	30
The Bug	50	37
Build Using	30	23
Edit Soft	30	23
Quadrant 6112	35	26
Sensible Speller	125	94
• for Supertext	125	94
• for Apple CP/M	125	94
• Pascal	125	94
BEST (Applesoft Program Optimizer)	40	30
Select Information Systems		
Select (with Superspell)	595	356
Silicon Valley		
Word Handler	199	145
List Handler	90	68
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Pascal Graphics Editor (48K II/II+)	100	69
Sof/Sys, Inc.		
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All four	1250	669
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PFS (New)	125	79
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Spellguard †	195	146
SuperCalc †	295	189
Southeastern Software		
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Data Capture 4.0/Videx, Smarterm, Superterm	90	65
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On Balance Volume Charting (Stock Market analysis) [Includes $300.00 first year maintenance and update fee]	1500	1299
Stoneware		
DBMaster	229	148
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Electronic Price Sheet	100	72
Compucube	30	22
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Graphics Processing System (Professional)	179	129
Synergistic Software		
The Linguist	40	30
The Directory Manager	25	19
The Star Gazer's Guide	30	22
Higher Text II	40	30
Higher Graphics II	35	26
Mailing List Data-Base	50	37
Program Line Editor	40	30
Modifiable DataBase	80	59
The Data Reporter	220	158
Integer BASIC Compiler	150	108
Global Program Line Editor	65	49
Data Reporter—Hard Disk	220	158
Versa Computing		
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VersaWriter Expansion Pac-II	40	30
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WHY PAY MORE?

The Helping Hands Of Computer Clubs

Hundreds of computer clubs have sprung up across the country. They're great meeting grounds for both the novice shopping for a first computer and for the pro wanting to learn new tricks of the trade

by Elizabeth Metzger

When Keith Thomas, an eighth-grade shop teacher in Walnut Creek, Calif., brought his new Apple II Plus home from the dealer last March, he took a long, hard look at his investment and froze. "You have no idea how inept you feel when you get that thing out of the box," exclaims Thomas. "I took one look at all that hardware and realized I had no idea how to use it."

Thomas bought his Apple after he got "hooked" at the West Coast Computer Faire. But when he actually had the physical machine, he realized: "I desperately needed help."

At the Computer Faire he learned about the San Francisco Apple Core, a computer club with some 1500 members, tailored specifically for Apple enthusiasts. There Thomas explored the potential of his new Apple computer, discovering applications and methods that he hadn't even dreamed of when he first wrote his check...and discovering also a multitude of warm, eager, supportive friends with similar interests. "For me," Thomas affirms, "the computer club has been the best place to learn about my computer."

Thomas is not alone. Indeed, computer clubs are becoming as popular as the personal computers that spawned them. Also, like personal computers, they have become more "user-friendly" with age. Whereas computer clubs were originally started by small groups of technologically sophisticated computer hobbyists who got together to exchange programming ideas, many of today's clubs' major role is to share information and review products for a broad range of members—many of whom have little or no computer experience.

Elizabeth Metzger is a free-lance journalist in Berkeley, Calif., who often writes on computer subjects.

Product information

Why are computer clubs so popular? What can a club offer a user that a dealer or company cannot?

Computer clubs—often called users' groups—are usually organized around specific makes of computers, simply because the users of any one machine find it valuable to gravitate toward people with compatible experience to swap programs and expertise. Although the clubs frequently have the cooperation of the manufacturer of the particular personal computer of the members' interest, the clubs are usually not affiliated with the manufacturer in any way. (See the sidebar on page 144 for more information on how to get in touch with clubs.)

One of the prime benefits a member gets from the computer club is honest product evaluations, based on the members' own experiences. If you are thinking about buying a personal computer but haven't yet settled on the exact make, you can supplement your comparison shopping in computer stores with advice and suggestions from members in different computer clubs. "At the club, you learn about the pros and cons of particular products before you go out and spend your money," says one club president. "The dealers just won't give it to you straight. I've met people at this club who have a high degree of first-hand technological knowledge. These are people I would not normally meet. They extend their help, and I've expanded my equipment."

Another member observes: "The dealers are often no help. After all, salesmen are there to sell. Many times I ask only for a demonstration, but they never seem to have the time unless you want to buy. It's a big problem. They might tell you it will take you two minutes to learn VisiCalc; then you go home and find out it takes a lot longer!" Finding out advantages and disadvantages of different personal computers for your particular needs can ease your mind when you finally take the plunge—after all, next to a car, a personal



photo by George B. Fry III; badge by Nancy Freeman

HOW TO LOCATE A COMPUTER CLUB

The best place to start is with your dealer. Many keep current lists of clubs. Others put customers in touch with each other if there is no formal club in the area. A secondary way to find a club is through a data bank like The Source or CompuServe. After getting on-line at one of these services, check through their bulletin boards. More often than not the bulletin boards contain pleas from data-bank subscribers who want to form clubs—or who have clubs in full swing and are looking for other interested computer owners. Additional resources are listed below.

APPLE: *Apple Orchard,* Volume 3, Number 3 (July-August, 1982), pages 34-39 have a complete list of all member clubs belonging to the IAC. For a copy, contact your dealer or *Apple Orchard,* 910A George St., Santa Clara, CA 95050; (408) 727-7652.

For information on how to start a club, contact Rance Fields, c/o International Apple Core, at the above address.

ATARI: "Computer stores are a good source," according to Atari's manager of users' group relations. For a booklet listing all the Atari clubs, contact Earl Rice, Marketing Manager, Atari Inc., 60 East Plumeria Dr., San Jose, CA 95134-2191; (408) 942-6830.

COMMODORE: *Commodore Magazine* has a special section that lists all users' groups. For a copy, contact your dealer or Commodore Business Machines, Inc., Publications Department, 487 Devon Park Dr., Wayne, PA 19087; (215) 687-9750.

DIGITAL: Contact your dealer for information on how to get in touch with computer clubs and users' groups for these machines.

HEWLETT-PACKARD: Contact the Users' Library, 1000 Northeast Circle Blvd., Corvallis, OR 97330; (503) 757-2000.

IBM: *PC Magazine,* Volume 1, Number 5 (September 1982) lists computer clubs on pages 341-343. For a copy, contact your dealer or *PC Magazine,* 1528 Irving Street, San Francisco, CA 94122 (415) 753-8088.

NORTH STAR: For a list of users' groups, contact Marketing Communications, North Star Computers Inc., 14440 Catalina St., San Leandro, CA 94577; (415) 357-8500.

OSBORNE: For information and lists of clubs, contact Glenn Evans, 184 Downey Street, San Francisco, CA 94117. Also see *The Portable Companion,* October-November 1982 issue, pages 20-31. For a copy, contact your dealer or Osborne Computer Corporation, 26538 Danti Court, Hayward, CA 94545; (415) 887-8080.

RADIO SHACK: Users get a free 12-month subscription to *Monthly Microcomputer,* which runs occasional names of clubs. For more information, contact your local Radio Shack store or computer center.

TEXAS INSTRUMENTS: Users receive a free subscription to *Texas Instruments Home Computer Users' Newsletter,* which carries lists of all clubs. For more information, contact your dealer or Texas Instruments Inc., P.O. Box 10508, Mail Station 5890, Lubbock, TX 79408; (1-800) 858-4565.

computer may be one of the largest investments you'll make.

The San Francisco Apple Core, which Keith Thomas joined, is but one club organized under the International Apple Core (IAC), headquartered in Santa Clara, Calif. Chapters now number 400 and represent more than 80,000 users in the U.S. and overseas. Because the Apple clubs are among the oldest and most numerous in the U.S., they've become something of a model for other clubs centered around other makes of personal computers.

The International Apple Core is in no way affiliated with, or financially supported by, Apple Computer, Inc., although the company helped organize the IAC in 1979. Apple, Inc. learned early on what other personal-computer manufacturers are now learning—that clubs benefit the companies as well as users. For that reason, many dealers will now refer potential customers to users' groups in the area.

Phil Roybal, manager of communications programs at Apple, and Jim Hoyt of the technical services department, have worked most closely with the IAC over the past several years. Roybal describes the relationship between Apple and the IAC as "extremely cordial." He recounts: "It was back in the late 1970s when we noticed that a lot of our customers and potential customers were not technically proficient. Jim and I realized we didn't have the time to help people directly. We thought we'd play a better role as a link between Apple and the users' groups."

"Apple realized users' groups were an important part of their sales base," says IAC's president Ken Silverman. "Roybal and Hoyt have been outstanding in their support." He adds, "But we'd like to get support in every department at Apple. We're working on that right now."

The relationship between club and company continues to evolve. The IAC recently worked out an agree-

Computer clubs—also known as users' groups—are becoming as popular as the personal computers that spawned them.

ment with Apple for the IAC to publish and distribute the "Apple Tech Notes," a 500-page, three-ring binder on hard- and software, with updates scheduled quarterly. All member clubs receive one free copy, and individual members have access to discount coupons through their clubs. Other manufacturers, such as Radio Shack and Texas Instruments, provide benefits to groups of users of their products as well.

Although some 400 Apple clubs are all part of the International Apple Core, the individual clubs are as different from one another as their members' needs and backgrounds. Annual dues can be as low as $5 or higher than $20. Although most clubs have fewer than 100 members, a handful, such as the San Francisco Apple Core and the Washington Apple PI in Bethesda, Md., have more than 1000. "Each club has its own personality," says one IAC representative, Rance Fields. "It's up to the officers to determine their club's emphasis."

Most of the Apple users' groups are general-interest clubs that attract a variety of professionals and interests. But several have a narrower focus. IAC member clubs include groups that specialize in the medical, legal, dental, agricultural, and educational fields. A few clubs, such as the U.C.L.A. Apple Users' Group and the Jet Propulsion Lab Computer/Apple Club, both in Southern California, were begun at specific institutions.

Most clubs schedule regular monthly membership meetings and do not require membership to attend. Most don't even require members to own computers. "Anyone can come to our meetings," says Jim Weil, president of S.P.C.A. (Society for the Prevention of Cruelty to Apples), who won his computer when he became the millionth visitor to the Wescon Electronics Fair in San Francisco. Typically, prospective members first come to a meeting or two to "check it out," according to another S.P.C.A. member Ed Eisenberg. "I'd say about a half-dozen people join at every meeting."

Special interest groups

Many clubs arrange their meetings for small groups of users with special interests—say, for owners of specific peripherals, or for people who want to learn different programming languages. One special-interest group of the San Francisco Apple Core is the VisiCalc Group, which meets once a month in the "clubhouse," a tiny, three-room suite next door to a shopping center a few miles from the ocean. The clubhouse contains the club's library, office, and meeting room, complete with an oblong table, a dozen folding chairs, a blackboard, and an Apple II Plus.

Woody Liswood, a management consultant from San Francisco, was one of seven VisiCalc users at a meeting last fall that included a C.P.A., a high-school computer science teacher, a self-employed bookkeeper, a shipping executive, and a computer hobbyist. Liswood started the VisiCalc Group two years ago when he realized that the VisiCalc manual simply wasn't sufficient. For novices, the VisiCalc Group is a place to learn the basics of the program. For more experienced users, the VisiCalc Group is a place to learn more sophisticated uses of the program, talk over problems, see what other people are doing, and get new ideas—all in a non-threatening environment.

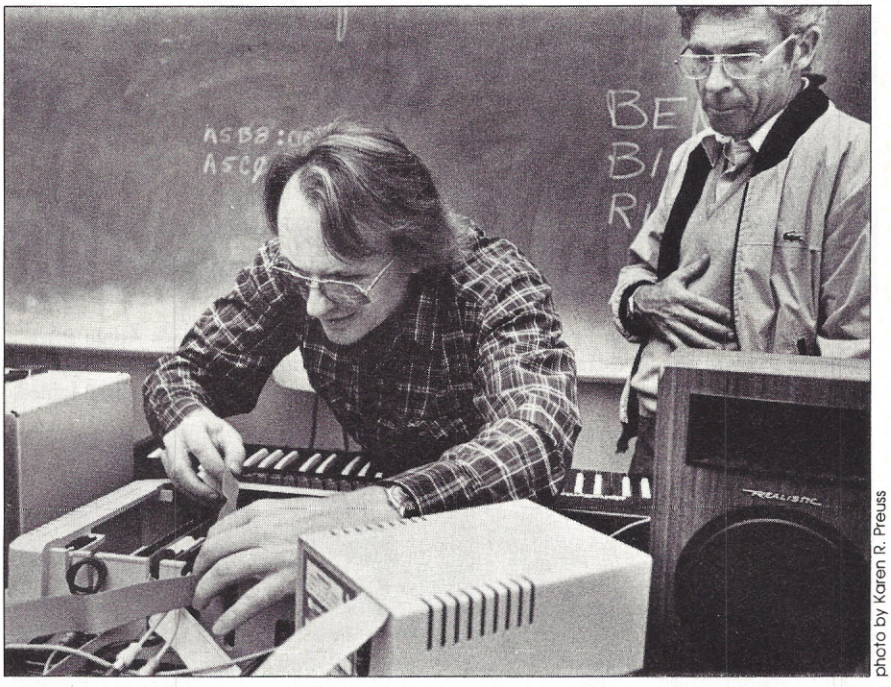
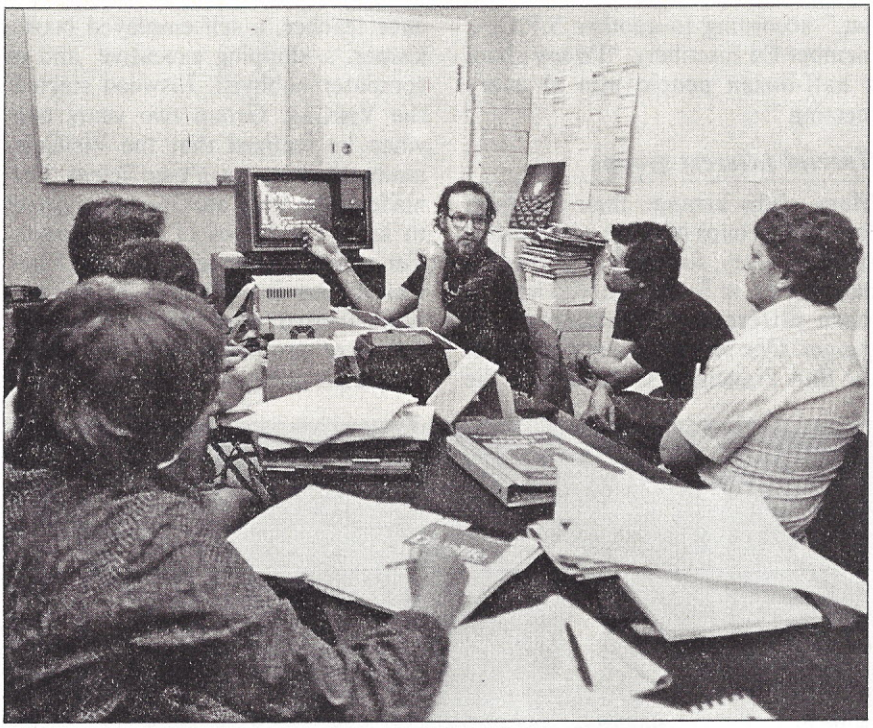


photo by Karen R. Preuss

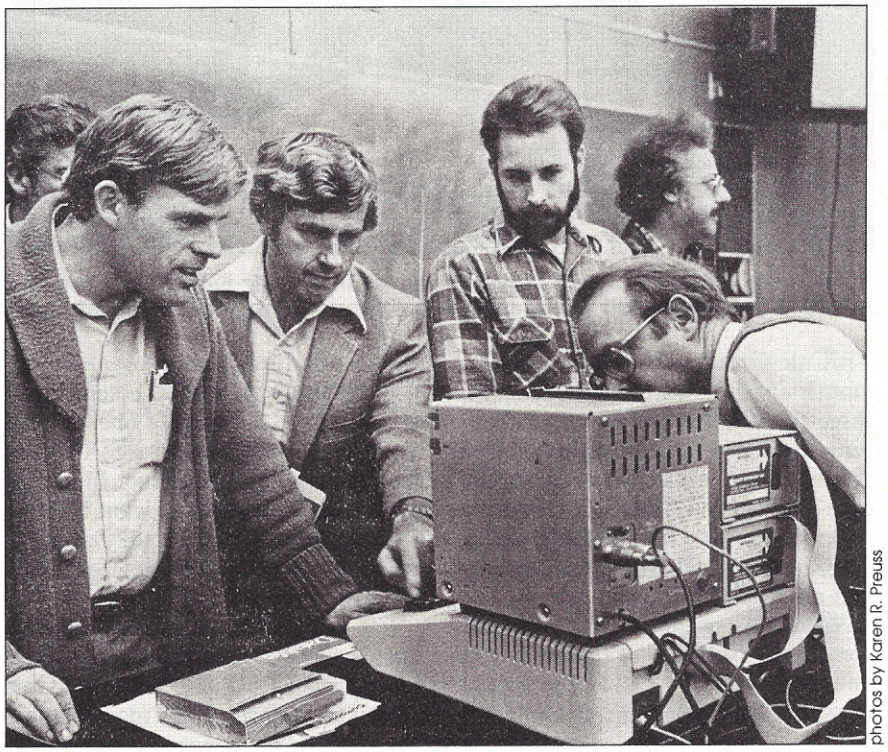
In the Apple P.I.E. club (Apple Programming and Interfacing Enthusiasts), members learn how to hook up their Apples to an alphaSyntauri Music Keyboard Synthesizer.

"The group is run like a seminar," says Liswood. Typically one or two members bring problems for which they are trying to construct financial models. They talk about what they've done, what difficulties they've had, answer questions, and get feedback from the group.

For example, one evening a member demonstrated a checkbook balancing modification to VisiCalc. One user wasn't sure if the modification would work for her, so he offered to



In computer clubs like San Francisco's Apple Core and Silicon Valley's Apple P.I.E., members explore the potential of their personal computers and discover new applications and methods that they didn't even dream were possible when they first joined.



photos by Karen R. Preuss

tailor a system to fit her needs. Liswood then demonstrated another spreadsheet kind of program called MultiPlan, and detailed its specific advantages over VisiCalc.

Group members agree that such meetings give them a rare opportunity to learn different approaches to particular problems. For example, one member says he once knew one way of calculating the internal rate of return. "Now I know three different methods, and I use them all at various times. I saw how someone else did it and discovered that in some cases another way might work out better than the way I knew."

Another special interest group of the San Francisco Apple Core is the Epson Printer Group, which is structured in a way similar to the VisiCalc Group. Mike Fisher, an attorney for the California State Judicial Council and the Epson Printer Group leader, explains: "We spend a lot of time going over specific questions someone in the group has. For example, we spent several meetings trying to write a program that would dump screen text." According to Fisher, programs are too often written and designed without considering the user's needs. He sees his group as one way to check out how useful specific programs really are. Fisher doesn't pretend to know all the answers. "If I or someone in the group can't solve the problem, I work on it for the next meeting."

Club leaders say that special interest groups are one of the main attractions of computer clubs. Special interest groups and classes are some ways to balance the needs of novices with those of computer professionals—both of whom tend to join computer clubs. One of the nicest benefits of such special interest groups is peace of mind. In the words of a teacher who uses VisiCalc for lesson plans: "I know if I run into problems, I can bring them here."

Some users say they join computer clubs mainly for the free and low-cost

One of the prime benefits a club member gets is honest product evaluations, based on other members' own experiences.

software. At the VisiCalc meeting, for example, Don Scellato made copies of his checkbook-balancing modification for anyone who wanted one. Each month the IAC sends every member club a "Disc of the Month," a program written by club members across the country and abroad, which they donate to IAC's library. Members are free to copy these programs, which are in the public domain. Many clubs have a special librarian in charge of the Disc of the Month.

This matter of copying programs skirts some sensitive territory. The IAC "does not condone any copying of copyright-protected programs," says Silverman. "This has probably been our biggest issue," adds Rance Fields. "About two years ago, the IAC and the San Francisco Apple Core came out strongly against copying copywritten commercial or personal software during any club activity—general meetings, board meetings, or special-interest group meetings. But it's difficult to catch people. "We don't want to be policemen. We take the 'consenting adults' approach to this thing, and figure what users do outside their club activities is their own business."

A somewhat less controversial form of obtaining low-cost programs is the newsletter of each individual club, which devotes most of its space to detailed reviews of new and old equipment and software. Another source of program information for Apple club members is Apple Orchard, a slick magazine published six times a year by the IAC and mailed free to member clubs. Individuals can subscribe for $15 a year. Apple Orchard's "Forbidden Fruit" department includes short reviews not only of new hardware and software for the Apple, but also books and catalogs.

Children and families

Children form one special-interest group that many clubs recognize. Most clubs include a sprinkling of children who come either with their parent members or on their own. In some clubs the kids have formed their own special "games" groups or junior chapters, and they may meet separately in another room while the adults discuss accounting applications or watch demonstrations of an AlphaSyntauri keyboard synthesizer.

One characteristic of computer clubs seems to be the relatively small number of women. In one club of more than 100 members, a mother of five who bought her computer two and one-half years ago to work with her autistic child, is among only a handful of women in the club. And she's the only woman member in a smaller club in a neighboring town.

Although no club that is a member of IAC can discriminate on the basis of sex, race, or age, club leaders admit that recruiting women has been slow. "Probably fewer than 10 percent of the members in San Francisco's Apple Core are women," says Rance Fields. "It's really for socio-economic reasons. More men than women own computers."

Fields and other club leaders believe the situation is changing. One way is through innovatively restructuring their membership specifically to broaden their appeal. Most clubs base their membership on individual users. One major exception in the Bay Area is S.P.C.A., which structures its membership around families and works hard to recruit new members. "We do this to encourage everyone—husbands, wives, and kids—to get involved in the club," says S.P.C.A.'s president Jim Weil. "We really want our club to be a community thing. We don't want anyone sitting at home."

If the turnout at S.P.C.A.'s monthly membership meetings is any indication, it doesn't appear as though very many members are sitting at home. "Most months," says Ed Isenberg, "we've got standing room only." A local store, the Computer Post—which not only helped start the club but provides space for the club's meetings—is trying to solve that embarrassment-of-riches problem by enlarging the meeting room. But even that may not be a permanent fix. "I believe that by the end of the year, we'll have between 200 and 300 families," Isenberg predicts.

Weil says the family membership policy has helped draw women into the club, and not just as passive observers. About 25 percent of S.P.C.A.'s members are women, equally divided between wives of users and women who own their own computers. More than half of the San Francisco Apple Core's Epson Printer Group members are women—mostly teachers who use their computers for their lesson planning.

You're not alone

Free and low-cost products, information exchange, and classes may be the main attractions to computer clubs. But if the Apple users are typical, a less tangible element is perhaps as important. Some club members refer to "group support." Others talk about their "loss of isolation" since joining a club.

The clubs have grown because they offer something special for the newcomer to computing. "You know, buying a computer is much scarier than buying a car," observes one club member. "With a car, you've got a long history of customers. You've got access to people who've been buying them for years. You don't have that with these computers." For most club members, computer clubs not only give them access to more knowledgeable users who love nothing better than to share their expertise, but remind them that they're not alone with their machines. Even if the only thing you know about your computer is how to find the on-off switch, there's usually a club member around who just might help you become a pro.

IF YOU'RE CONFUSED PERSONAL COMPUTER,

At this moment, there are no less than 50 personal computers on the market. And more are being introduced every day.

On one hand, having all those options is a good thing. On the other, it can make picking the right one pretty difficult.



Computers come in two parts. You have to buy both.

We'd like to help. So here are a few suggestions about how to buy the computer that's right for you.

Computers come in two parts.

One part is the "hardware," which is the machinery itself. The other is the "software," or a program, as it's sometimes called.

Software is the part that tells the computer what to do, the way a driver tells a car what to do.

Without software, a computer can't do anything.

And vice versa.

You have to buy both.

Buy the software first.

Since the reason you're buying a computer is to get the capability the software gives you (remember, it's the software that knows how to get things done), it makes good sense to pick the software first.

Start by making a list of the things you want to use the computer for. It can include almost anything—any kind of inventory, filing, accounting, graphics, reporting, record-keeping, analysis—you name it and there's probably a software program that does it.

Next, take the list into a computer store and ask the salesperson to give you a demonstration of the program, or programs, that will do the things you want.

Even though you'll need a computer for the software demonstration, keep in mind the computer is just a vehicle. The software is the driver. And once you've decided on the software, picking out the rest of the computer system will be much easier.

The simpler the better.

Look for software that's easy to learn, easy to use, and that does the job in the simplest way possible.

Good personal software should be, as the computer people say, "friendly." Meaning that it helps you do what you have to do without getting in the way.



Meaning there are no complicated routines to follow to perform a simple task. And no programming language to learn.

Some people, however, will tell you that software has to be complicated to be powerful.

Nothing could be farther from the truth.

Because in order for a program to appear simple to you on the outside, it has to be extremely complex on the inside.

ABOUT BUYING A HERE'S SOME HELP.

Good software keeps the complications in the computer, where they belong. And keeps the capability at your fingertips. It's that simple.

You simply have to see for yourself.

You can read any number of interesting books and magazines about personal computers. You can ask friends who have them. You can look at all the sales literature you can get your hands on. And you should do all those things before you decide to buy.

But as helpful as all that can be, there really is no substitute for a real, live demonstration.

When you do go out shopping, we recommend you take a look at the PFS® Family of Software.

The PFS family is designed the way we think all software should be: simple, straightforward and powerful.

Currently, three products make up the family. PFS:FILE, PFS:REPORT and PFS:GRAPH, with more programs on the way. Here's a little more about each of them.

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Basically, FILE works like a paper filing system, without the paper. So you can record, file, retrieve and review information in a fraction of the time it takes with a conventional filing system.

FILE lets you arrange your information in "forms" you design yourself. So you can get at and really use your information in ways never before possible.

What's more, FILE lets you change the original form without having to redo the information on it.

PFS:REPORT. Making the most of your information.

REPORT summarizes the information on your forms so you can use it to analyze, plan and make better-informed decisions.

With REPORT, you get presentation-quality reports—sorted, calculated, formatted and printed—automatically, in seconds.

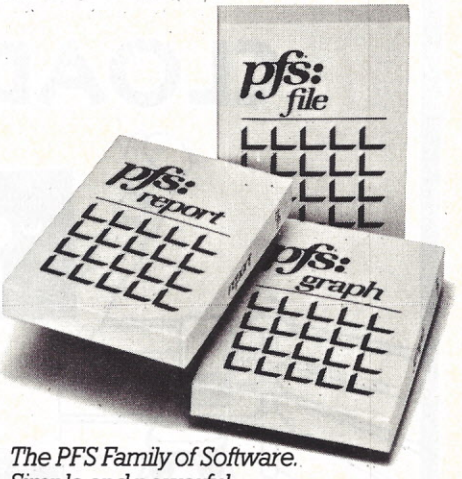
PFS:GRAPH. Instant pictures.

GRAPH gives you presentation quality bar charts, line graphs, and pie charts, in black and white or color, on paper or the computer screen. To get a clearer picture of things and spot trends instantly, you simply enter your information and specify the kind of graph or chart you want. GRAPH does the rest.

You can also mix and match line and bar graphs, or even stack or compare up to four bar graphs simultaneously.

And GRAPH will work with PFS:FILE, VisiCalc® files, or data entered directly into the computer.

Best of all, compared to the cost of hand-drawn graphics, GRAPH can save you enough money over the course of a few months to pay for the computer it runs on.



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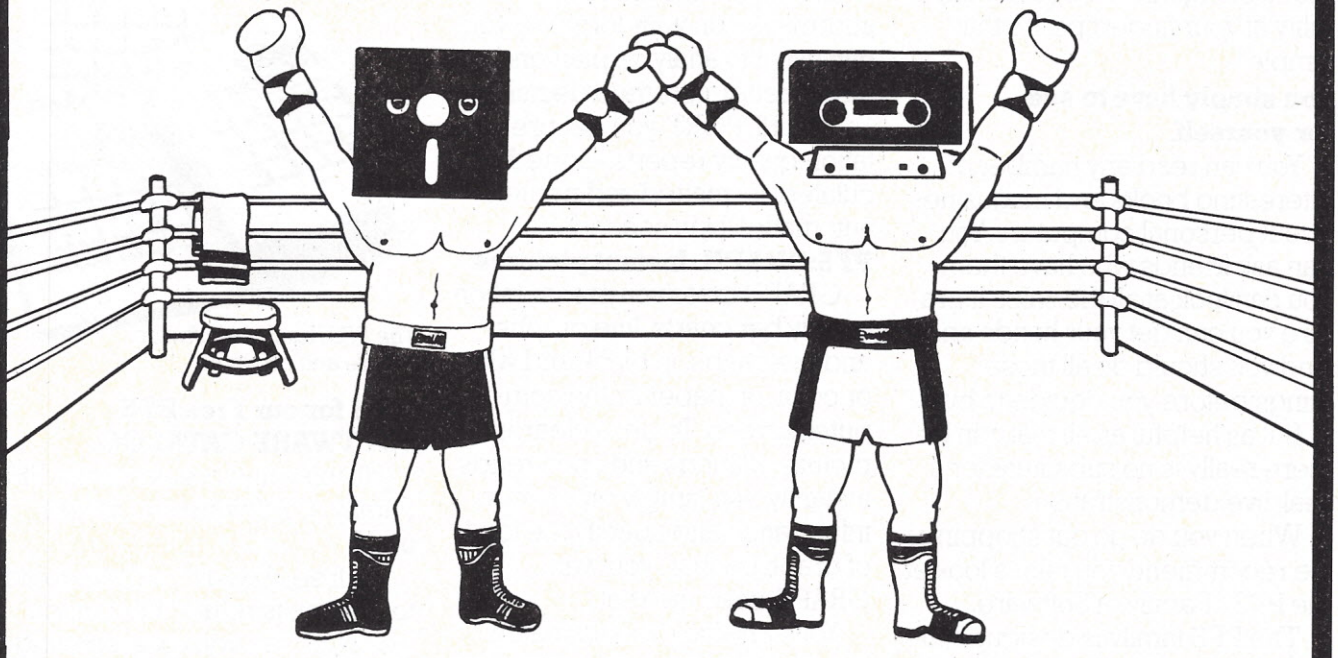
CIRCLE 94

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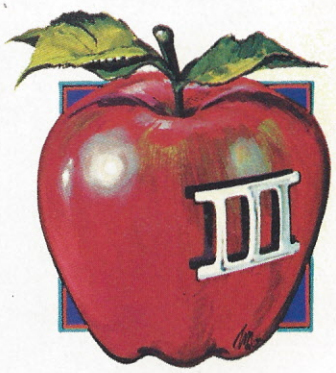
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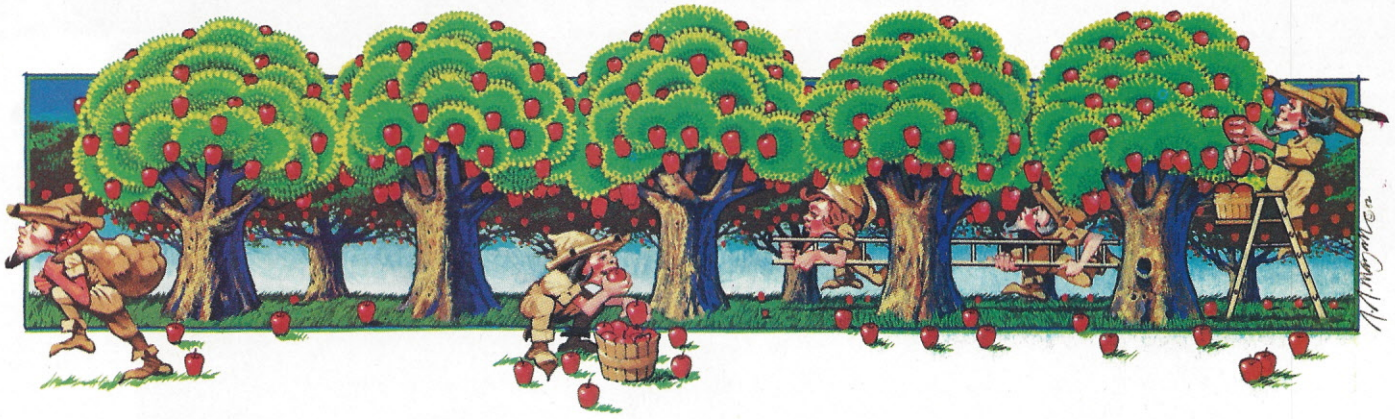
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CIRCLE 82



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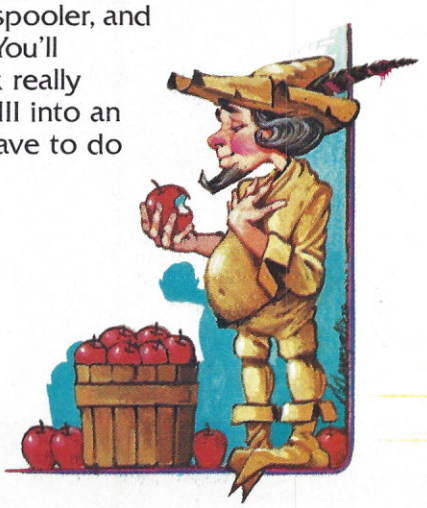
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CIRCLE 59


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5-slot expansion bus

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97 keys, including 12 function keys
Separate numeric keypad and cursor control clusters
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Upper- and lower-case letters

Display Units
12-inch monochrome (green phosphor) or 13-inch full-color, 25 lines x 80 columns
High resolution, 720 x 300 pixels

Mass Storage
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Communications Options
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3270 SNA stand-alone (Summer 1983)
3270 BSC and SNA cluster (Fall 1983)

Operating Systems
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CIRCLE 60

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How A Spreadsheet Calculator Can Aid Small Businesses

DOING BUSINESS WITH VISICALC
STANLEY R. TROST
SYBEX, INC.
BERKELEY, CA
259 pp., $11.95

VisiCalc, the spreadsheet calculator, has become the single most popular software program for personal computers. To help readers understand and learn to use the program effectively, Stanley Trost's *Doing Business with VisiCalc* is a welcome addition to any computing library. It is also an excellent supplement to VisiCorp's program manual.

The premise of the book is straightforward: to show a collection of about 50 VisiCalc programs that can be used in business environments, and to guide the novice to a more advanced level.

The book achieves both aims. The author assumes that readers have an elementary understanding of the program, which can be attained by conscientiously working through the tutorial section of the VisiCalc manual—an absolute must for anyone without an accounting background.

Trost, an engineer and businessman, wastes no time getting readers started. After a quick introductory chapter—which includes a useful example of a master layout for the business forms used throughout the book—he delves right into record-keeping, check and expense registers, invoices, and income statements. In each area, Trost not only gives the full set of VisiCalc instructions, but explains each step of the program and the method of data entry. The user can thus understand each example and then modify it, if necessary, to suit his individual applications.

After the section on elementary record-keeping, the author launches into some heady finance with topics such as comparative income statements and balance sheets, depreciation, and capital equipment replacement. This finance chapter includes an interesting setup for evaluating an investment portfolio mix by type of investment and projected gains and yields, rather than by individual stocks and bonds. The author should have expanded this section into an entire chapter on personal investment, which is a fruitful market for VisiCalc experts with strong backgrounds in this area.

Subsequent chapters review a complete business budgeting system, detailed programs for sales analysis and forecasting, and manufacturing control. The final two chapters contain programs for the real-estate investor, and ways to set up spreadsheets for personal income tax forms. This last topic, with its instructions for setting up the long version of the 1040 form, and schedules A, B, E, and Y, is especially valuable.

Readers must not assume that *Doing Business with VisiCalc* is a simple cookbook, however. It demands some work to understand the programs and get the most from them. If your need is for simple

(continued on page 158)

Look at what the best modem has been reduced to.

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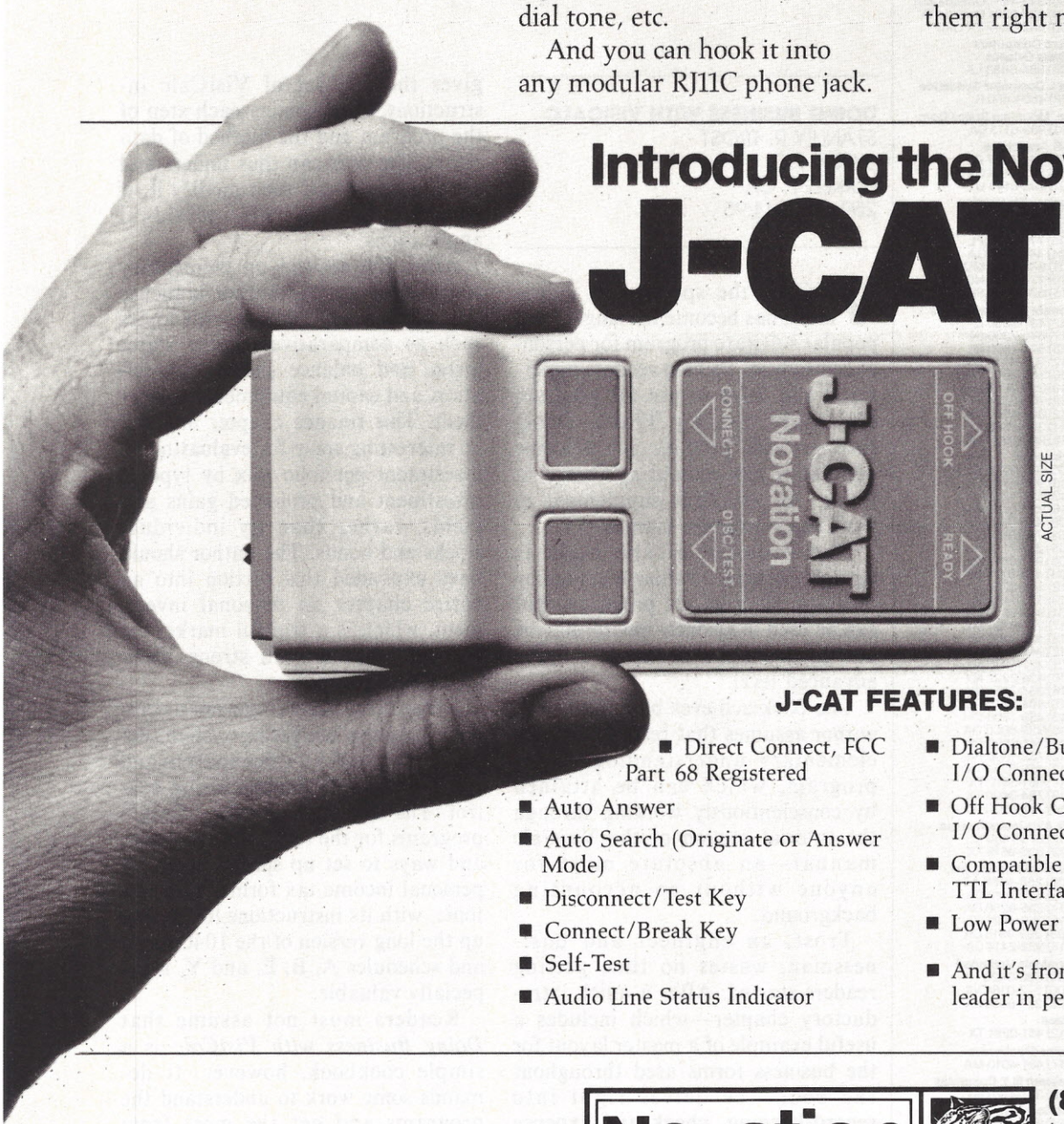
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It costs less. If you've shopped around, you know a modem with close to these features costs $250 or more. Our LSI technology has let us do the right thing with the price, too. Suggested retail—$149.

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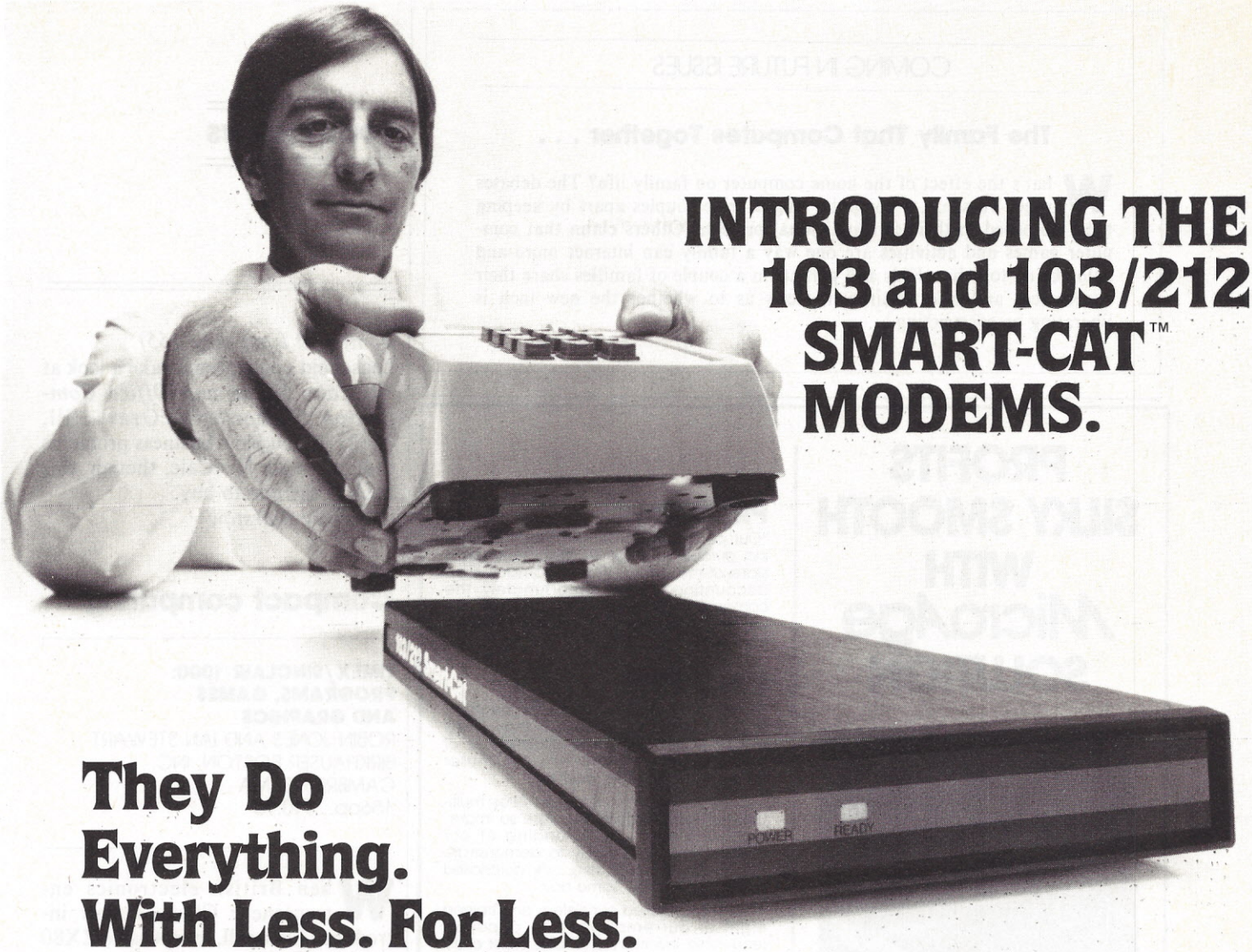
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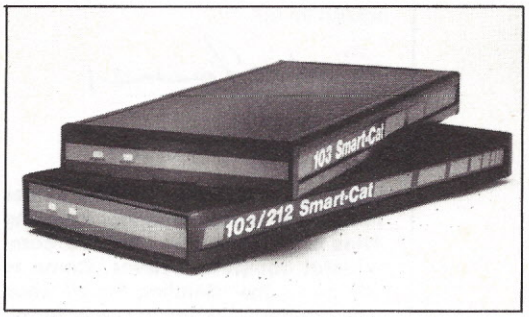
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First, each is the best modem in its class. They do more, do it easier and do it in less space. The reason: our LSI technology is state-of-the-art. Our Smart-Cats run better and cooler—and will for years.

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CIRCLE 63

COMING IN FUTURE ISSUES

The Family That Computes Together . . .

What's the effect of the home computer on family life? The debates rage. To some, a computer might drive couples apart by keeping them absorbed in their own individual projects. Others claim that computer games and activities are one way a family can interact more and enjoy being together. Kids and parents in a couple of families share their experiences and offer their own views as to whether the new tech is liberating or constricting.

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"Because of MicroAge, we expect to increase our cash flow by controlling receivables, keeping our inventory lower, making our customer shipments faster...all without increasing our staff."

"For our $25,000 investment...we expect our Altos computer system to save us about $100,000 next year. MicroAge...we should have gone to them first, they had the right solution for us."

Scott O. Fresener

Scott Fresener
US Screen Print Industries Inc.
Tempe, Arizona

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CIRCLE 64

BOOK REVIEWS

(continued from page 155)
household applications, take a look at *VisiCalc: Home and Office Companion* (Osborne/McGraw-Hill, 1982). If you have business problems that yearn for VisiCalc, though, this book is the one to buy.
—*Jeffrey Bairstow*

Compact computing

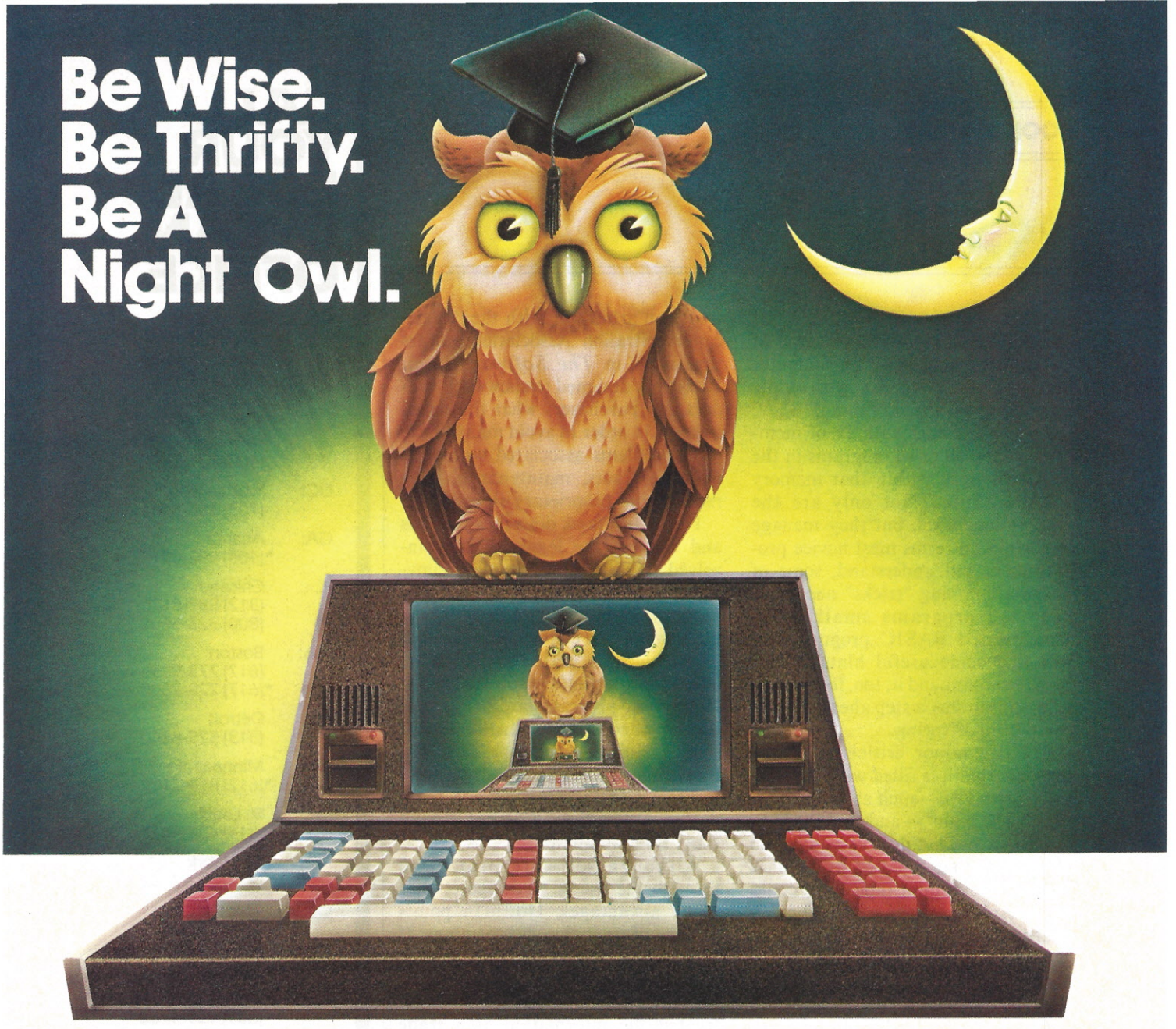
TIMEX/SINCLAIR 1000: PROGRAMS, GAMES AND GRAPHICS
ROBIN JONES AND IAN STEWART
BIRKHAUSER BOSTON, INC.
CAMBRIDGE, MA
156pp., $10.95

When British electronics entrepreneur Clive Sinclair introduced his small, inexpensive ZX80 personal computer a few years ago, the giants in the industry barely raised an eyebrow. A decade or so ago, however, Sinclair designed a successful calculator, and today the machine is so inexpensive that I almost expect to be given one each time I buy a tankful of gas. History has a way of repeating itself, so it's no surprise that Sinclair's widely distributed computer—now called the Timex/Sinclair 1000—can be purchased for less than $100 in department and discount stores across the U.S.

Although the 1000's manual is, like the device itself, small and somewhat cryptic, it's surprisingly good when compared with the manuals of the 1000's larger cousins. Sensibly, Robin Jones and Ian Stewart, two British computer professors, have not attempted to rewrite the manual, but have produced an excellent complement to it.

In a refreshingly frank style, the authors tell you how to live with your Timex/Sinclair 1000. They clearly had a good time working with it,

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CIRCLE 126

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which comes across well. This is probably a strong point in favor of owning the machine—it's a computer that you can have fun with while learning about programming.

The 1000 comes with 1k of memory, but the 50 or so programs in the book will work within that memory size limitation. Not only are the authors ingenious, but they manage to explain, in terms most novice programmers will understand, some of the programming "tricks" needed to keep the programs small. Even sophisticated BASIC programmers will find some useful hints in this book. I recommend it, too, for parents who want to stay a step ahead of their computing offspring.

My two minor criticisms of the book are that it is filled with the puns the British love—such as "chips that pass in the night"—and that the U.S. publishers did not do a very good job of weeding out Anglicisms such as "valve" for vacuum tube. This could be considered part of the book's charm, however, just as the Timex/Sinclair 1000's idiosyncrasies are part of its appeal.

—*Jeffrey Bairstow*

But would it hold up in court?

THE SOFTWARE LEGAL BOOK
PAUL S. HOFFMAN
CARNEGIE PRESS
MADISON, NJ
THREE-RING BINDER, $79.95

Today it's not enough just to be a good programmer or astute entrepreneur to succeed in the software business. You need to have a solid understanding of the legal environment your business operates in. Paul Hoffman, formerly chairman of the American Bar Association's section on science and technology, and currently an arbitrator with the American Arbitration Association, covers that need in *The Software Legal Book*. It's designed to show both vendors and purchasers what they need to know in order to avoid many of the legal problems associated with software contracts, maintenance, warranties, and proprietary rights.

Hoffman's book describes the pros and cons of the legal methods involved in software protection: copyrights, trade secrets, and patents. The author maintains that a copyright is usually the best course for protecting user-oriented materials such as operator manuals. But he notes, "Computer programs are better protected through the trade-secret route." Hoffman cautions, however, that while trade secrets can be used to protect ideas, methods, and techniques, a copyright does not protect these three intangibles.

Although software protection through the use of trade secrets has many advantages, Hoffman points out one of its major shortcomings: If you ever decide to sue someone for unauthorized use of your trade-secret information, you must show that you treated the information as a trade secret. "As a matter of practice," Hoffman writes, "breaches of confidentiality by a licensee do not have nearly the damaging impact of breaches by your own firm." So if you choose the trade-secret route, you had better be able to prove your case.

The author also discusses many of the legal considerations buyers should examine before purchasing any software. Among the more important questions that Hoffman says potential buyers must ask are: "Do we now have (or will we have) the ability to maintain the software? If so, who will own the improvements we make? How hard would it be to convert to alternative software? What happens if the software dies and the vendor is dissolved? Are there any present or future ownership interests that we should have?"

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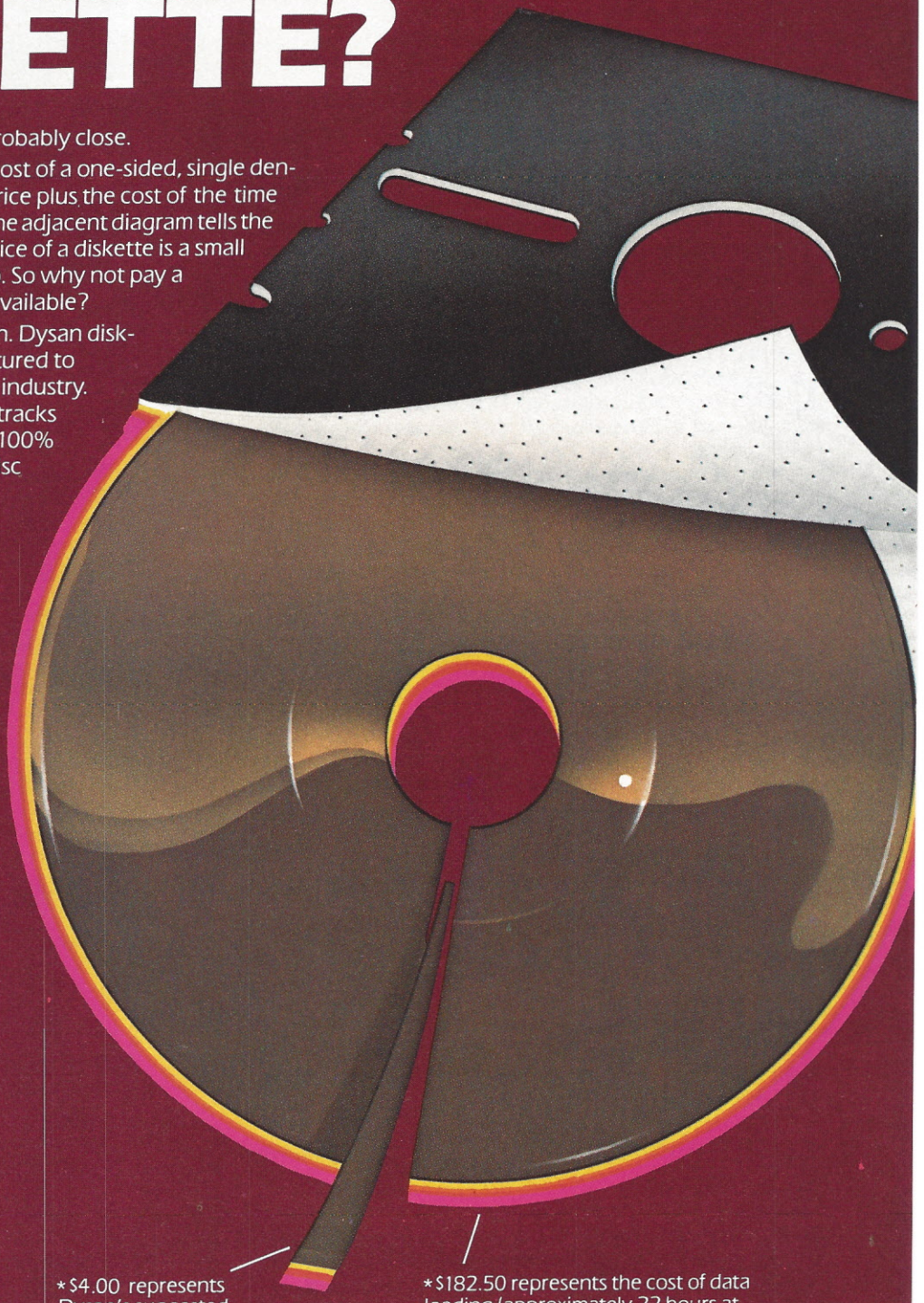
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*$182.50 represents the cost of data loading (approximately 22 hours at 11,106 keystrokes/hour at a labor cost of $8.23/hour), based on 1981 Data Entry Management Association (DEMA) National Averages.

CIRCLE 21

Check The Chart Before You Choose Your New 16-Bit Computer System.



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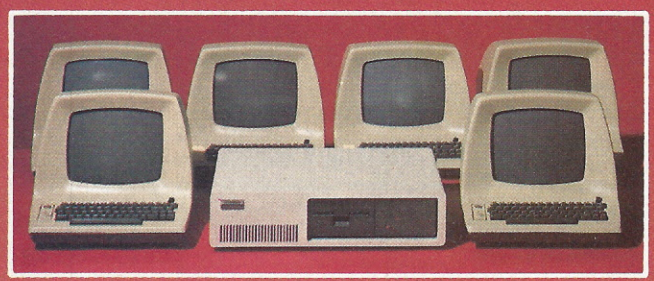
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USER Memory	128K-1 Mbytes	16K-256 Kbytes	?
IBM-PC Compatible Expansions Slots Beyond Professional Configuration[1]	8 Slots	0	?
Resident Floppy Disk Storage	Dual 320K (std)	Dual 160K (Opt) Dual 320K (Opt)	?
Resident Cache Buffer Hard Disk Storage	5M/10M	—	?
OPTIONAL OPERATING SYSTEMS (Supported by Company)[2]			
MS-DOS (PC-DOS)	Yes	Yes	?
CP/M 86	Yes	Yes	?
MP/M 86	Yes	—	?
OASIS-16	Yes	—	?
XENIX	Soon	—	?
OPTIONAL HARDWARE EXPANSION BOARD (Supported by Company)			
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B/W and Color Display Controller	Yes	Yes	?
Expansion Memory	Yes	Yes	?
Z-80 CP/M-80 Board	Yes	—	?
Cache Buffer Hard Disk	Yes	—	?
Time/Calendar Board	Yes	—	?
IEEE Bus Controller	Yes	—	?
8" Floppy Disk System	Yes	—	?
8" Hard Disk System	Up to 40 Mbytes	—	?
Tape Cartridge System	Yes	—	?

[1] For comparison purposes, typical professional configurations consist of 16-Bit 8088 Processor, 128K RAM with Parity, Dual 320K 5-inch Floppies, DMA and Interrupt Controller, Dual RS-232 Serial Ports, Centronics Parallel Port and Dumb Computer Terminal or Equivalent.

[2] Columbia Data Products also supports CP/M 80* with an optionally available Z-80 CP/M Expansion Board.

*As advertised in BYTE Magazine, August 1982.



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CIRCLE 45

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Hoffman further instructs the software buyer on how to incorporate a software proposal into the contract he will sign with the vendor. He points out that the best contract is one that "makes an accurate description of the responsibilities and risks of both parties."

Hoffman's unique background has enabled him to write a comprehensive guide that should be read not only by programmers, software executives, and sales representatives, but also by software purchasers and lawyers for both parties involved in a software dispute.

—Roy Katz

Words and more words

DICTIONARY OF COMPUTING
FRANK J. GALLAND, ED.
JOHN WILEY & SONS, INC.
NEW YORK, NY
330 pp., $34.95

In a field that is subject to rapid invention of new devices and words to describe them, a specialized dictionary is welcome. This handsome volume is well up to Wiley's usual high technical standards, and appears to be comprehensive. The book is clearly aimed at computer science students, but it will be equally appreciated by businessmen, managers, data-processing personnel, and writers.

By subjecting the dictionary to a test of random words that have either bothered or intrigued me in the past, I found that I could stump the book only rarely. In addition, there was a good, brief description of UNIX, the operating system developed by Bell Laboratories, and expansions of acronyms such as SNA (System Network Architecture) and VM (Virtual Machine or Virtual Memory). There was no mention of VisiCalc or spreadsheet calculators, however.

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CIRCLE 65

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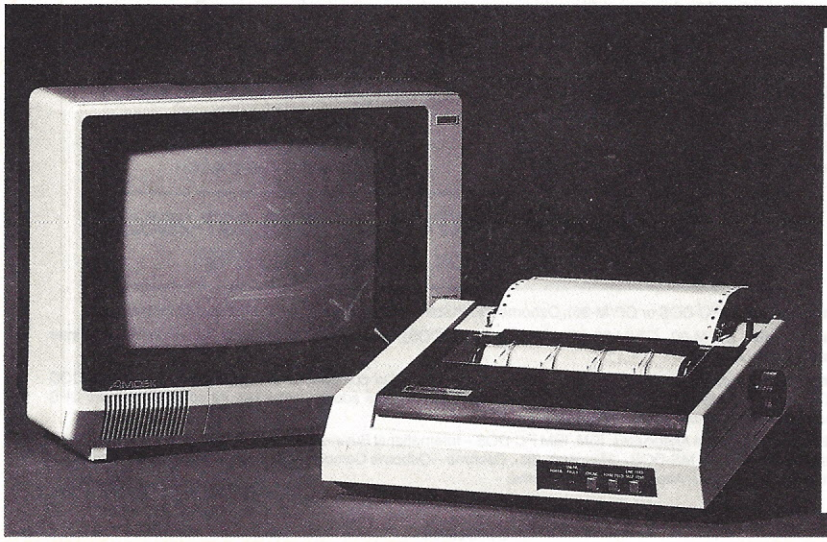
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CIRCLE 70

I might cavil with some of the book's definitions, but most of them are sound. I would also question why a half page was devoted to an explanation of logarithms and the rules for their use. Such material more properly belongs in a math textbook where it can be described at greater, and more satisfactory length. But these are minor criticisms. The editors of the *Dictionary of Computing* have coped well with the complexities of this field.

—*Jeffrey Bairstow*

A prescription for computerphobia

HOW TO BUY A PERSONAL COMPUTER (WITHOUT ANXIETY)
JONATHAN D. LIEFF, M.D.
BALLINGER PUBLISHING CO.
CAMBRIDGE, MA
113 pp., $16.50 hardbound; $9.95 paperback

Dr. Lieff is a psychiatrist who decided a few years ago to buy a personal computer, but was frustrated by the lack of a suitable non-technical guide. This book is Lieff's attempt at the non-technical guide he couldn't find when he began his computer investigation. As an introduction to the machines, the book will be useful to the novice.

Most of the book is devoted to explanations of hardware, with the usual descriptions of bits and bytes, processors, and floppy disks. One chapter reviews several personal computers, but the book fails to attack the major problem inexperienced users have—buying or developing appropriate software.

The range of possible personal-computer applications is so broad I doubt that any one book could successfully address the problems of both software and hardware purchases. A system that will satisfy the

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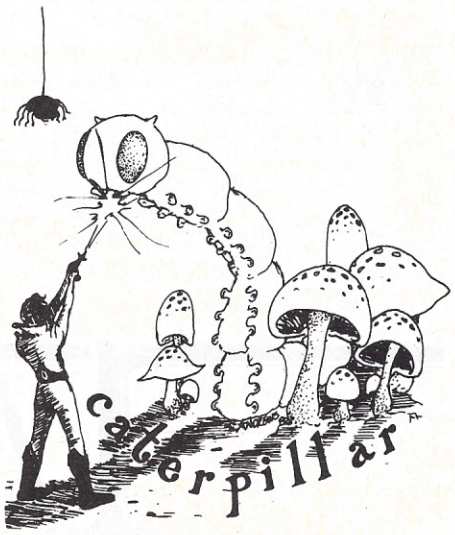
CIRCLE 84

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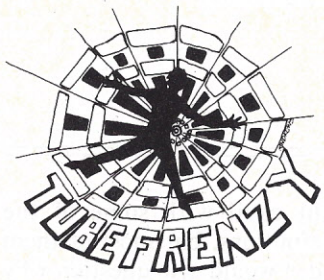
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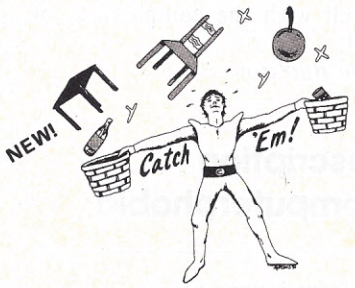
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CIRCLE 115

needs of, say, a realtor is clearly different from the one needed by a doctor's office or for home use. So I recommend Lieff's book with the caveat that the first-time buyer will still need more advice before making an actual purchase.

—*Jeffrey Bairstow*

For the budding real estate tycoon

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Where *Doing Business with VisiCalc* has wide applications in a range of businesses, *The Power of: VisiCalc Real Estate* is very limited; it is really a book for the people heavily involved in property development and speculation.

The book contains eight applications—condominium conversion or tract-home development cash-flow analysis, for example—that are as dry as the stock pages of *The Wall Street Journal*. If you're not involved in commercial real estate, this book is not for you.

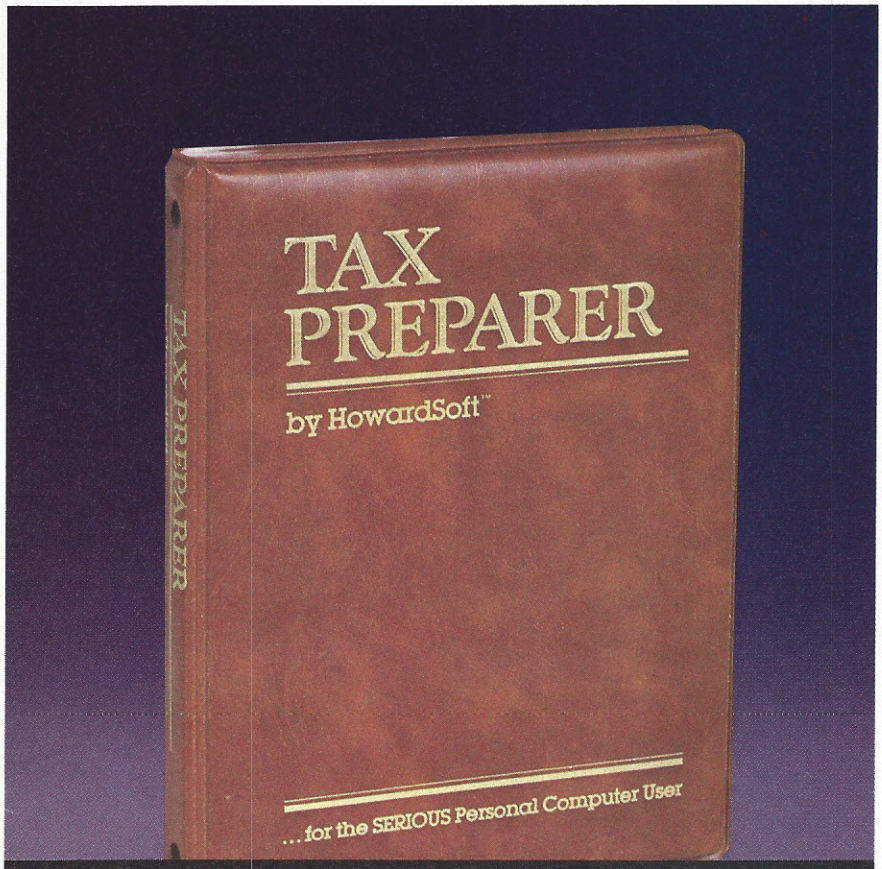
The book is produced in typescript format, with printouts directly reproduced from a dot-matrix printer. Consequently, it is difficult to read and even harder to use. The real estate applications in Trost's *Doing Business with VisiCalc* are far easier to understand and use. The authors of *The Power of: VisiCalc Real Estate* claim, however, that no special training is required to benefit from the text. This may be so, but you should be highly motivated before you open the pages and attempt one of the programs.

—*Jeffrey Bairstow*

COMING IN FUTURE ISSUES

Software From Scratch

Have you ever wondered who designs the software packages for your personal computer? Where they get the ideas—how they do it? Our story begins at the beginning—it traces the birth and development of one software package from its initial design to the moment it lands on your dealer's shelf. If you've ever thought about writing software, this is an article you won't want to miss.



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Epson.

The new Epson QX-10 is unlike any personal computer you've ever seen. It's a computer for people who don't have the time to learn computers; a computer you can be using within minutes.

And fortunately, you don't have to take our word for it. Here's how *Byte*, one of the computer industry's most prestigious magazines, describes the QX-10.

The first anybody-can-use-it computer.
"The Epson QX-10 (is) a computer for less than $3000 that may well be the first of a new breed of anybody-can-use-it 'appliance' computers ... In addition to being a highly integrated word processing/computer system that offers as much usable processing power as almost any existing microcomputer, the QX-10 ... system is designed to be used by people with minimal technical knowledge. We've certainly heard that claim before, but Epson has delivered on this promise in a way and to an extent that *no* microcomputer manufacturer has done."

That's nice to hear from a magazine like *Byte*, of course, but it doesn't surprise us. It's just what we intended the QX-10 to be all along.

More computer. Less money.
But useability isn't the only thing the QX-10 has going for it. As *Byte* says, "the QX-10 gives you a great deal for your money.

"Help is available at any time through the HASCI (Human Application Standard Computer Interface) keyboard Help key ... Text can be entered at any time just as you would in a conventional word processor. The Calc key turns the system into a basic 4-function calculator. Graphics can be created via the Draw key. The Sched (schedule) key gives you access to a computer-kept appointment book, a built-in clock/timer/alarm, and an event scheduler."

Advanced hardware for advanced software.
As for hardware, *Popular Computing*, another industry leader, says: "The QX-10 includes ... a number of advanced hardware features ... The basic components of the system are a detachable keyboard, a high resolution monochrome display, and a system unit containing two 5¼ inch disk drives. The drives use double-sided, double-density disks (340K bytes per disk) and are amazingly compact ... The QX-10 uses an 8-bit Z80A microprocessor. The system contains 256 bytes of RAM. Some of the RAM is ... battery powered ... which lets the computer retain information when the power is off."

You won't have to wait much longer.
The new Epson QX-10 may very well be the computer you've been waiting for. And fortunately, you won't have to wait much longer — it will be appearing soon in computer stores all across the country. In the meantime, write Epson at 3415 Kashiwa Street, Torrance, CA 90505, or call (213) 539-9140. We'll be happy to send you copies of our reviews.

After all, as *Popular Computing* puts it, the QX-10 will "do for computing what the Model T did for transportation."

And we couldn't have said it better ourselves.



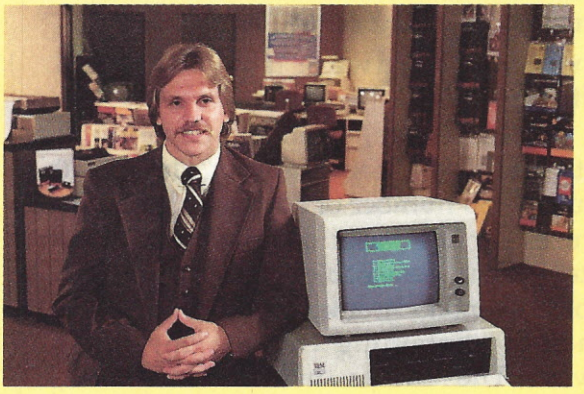
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CIRCLE 96

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CIRCLE 46

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Noisy phone lines and procedures for detecting errors and resending data can slow the transmission speed.

DATA COMMUNICATIONS

(continued from page 101)

emulate one or more mainframe terminals; others let you set up your computer as an electronic bulletin board for a users' group, a club, or a business. But the software having the most general use provides two main functions: transferring files and providing access to information utilities. More expensive programs offer these functions, accompanied by error-correcting safeguards and other convenient features.

Sources of software for modems include modem manufacturers, computer manufacturers, and independent software houses. Some modems come with a fair amount of software, but most provide little beyond system test programs, if that. Whatever the source of your software, certain basic features are a must.

Software compatibility

Compatibility comes first. Certain software programs work only with specific computers and modems, even if the software uses a common operating system. An operating system is housekeeping software that links a computer with its mass storage devices and its peripherals. For instance, Vector Graphic's Conect software works only on a Vector Graphic computer, even though the computer has a CP/M-based operating system. And as of this writing, Microcom's MICROCourier electronic-mail program for the Apple works only with a Hayes Micromodem. No other full electronic-mail package for the Apple computer is yet available.

A user may actually need separate software to connect the modem with each operating system he uses with his computer. Some companies make communications software that works with more than one operating system; others make different programs, sharing the same command structure, for different operating systems. Even within any one operating system, a program may be able to handle only a certain type of file structure. For example, an Apple program may be able to capture and transfer text files but not binary files.

A user whose word-processing or spreadsheet program creates files with an idiosyncratic format may be able to print them, but may not be able to transfer them via the modem unless the vendor sells a matching communications program. However, some programs, such as VisiCalc, are so popular that several firms make programs to either transfer the files or convert them to a transferrable format. Some word-processing programs, such as Hayden's Pie Writer, even have the capability to transfer files via a modem, although such a capability could not be considered a full communications program. As a last resort, you can "fool" the computer into transmitting anything it can print by taking advantage of the fact that a modem uses the same type of port as a printer. Load the program file into memory and, after making connection with an acoustic or handset-connected modem, give the computer a command to "print" the file into the port to which the modem is connected.

File transfer/data inquiry

More than anything else, people buy modems for transferring files and for accessing data banks—in most cases using an information utility. Therefore, all general-purpose communications programs let you connect up with someone else or with an information utility, talk via screens and keyboards, inquire after data, and send the contents of one computer's memory to another computer's memory through a quick, unverified data dump.

More advanced software accomplishes these basic functions particularly fast, easily, and accurately. Logging onto information utilities can be a time-consuming task of entering phone numbers and passwords with various waiting periods in between. But some communications packages automate this logging procedure, storing whole strings of log-on procedures for a number of different utilities.

The capability of transferring files from one disk to another via the modem is a tremendous help. Disk-to-disk transfer eliminates the bother of having to transfer received files from the computer's memory to disk, and having to bring files from disk into memory before they can be sent. Also, with such capability, files or groups of files too large to be held in memory all at once can be sent without trouble. Disk-to-disk transfer also lessens the possibility of a power surge or power failure wiping out files stored in memory overnight, as might happen during unattended operation.

It is possible to get a communications program that will compress files by removing blanks between word spaces and line returns. If you can compress files into half the memory space they would ordinarily occupy, you can considerably reduce the time that the computers are connected to the telephone lines—thus significantly cutting your costs of transferring files. However, such file-compression programs require a fair amount of off-line time for the computer to compress the files at one end, then decompress them at the other. If large files are being sent and large compressions are possible, a file-compression feature may be useful.

Software enabling you to control the personal computer from a remote site eases the task of data inquiry and file transfer if you travel or you need to address an office computer while at home. Editing features in the software may allow you to compose messages or make last-minute corrections to files before transmitting them. Communications programs vary widely in how easy these functions are to use. And remember, a feature has to be usable in day-to-day operations if it is to be of any value.

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FACIT DATAROYAL

CIRCLE 73

Printers, printers, and more printers.



As for the accuracy of transmission, the best guarantee is provided by verified data transfer, a feature of all sophisticated communications software. Verification is done through one or more protocols to detect and correct errors. The simplest such protocol, parity checking, has about a 50 percent chance of catching an error in any given byte of transmission. The most advanced methods of sending, checking, and retransmitting whole files provide close to 100 percent accuracy—especially important when sending large amounts of numerical data.

Other software functions

Advanced communication software can also include other valuable functions. One such function is security. Whenever your computer is linked to another through a modem, data inquiry by the other user directed to your own computer can put your confidential files at risk. Advanced software programs allow you to protect your confidential programs by passwords, to prevent unauthorized access to your computer over the telephone lines. Some programs even allow you to set up several tiers of security for different users in an organization, which you can assign depending on who is authorized access to what data. Keep in mind, however, that a program that doesn't allow you to forego password protection could be a bother when you want your system open to fast access and operation.

The need for a program to be both sophisticated and easy to use can create conflicts. The price of power is often complexity. Many powerful communications programs require lengthy study before you can operate them. True, there are some complex programs so menu-driven that their use is relatively easy, but a user may get mighty tired of having to go through a multitiered array of help menus every time he wants to send a five-line message. There are, however, programs such as Transend by

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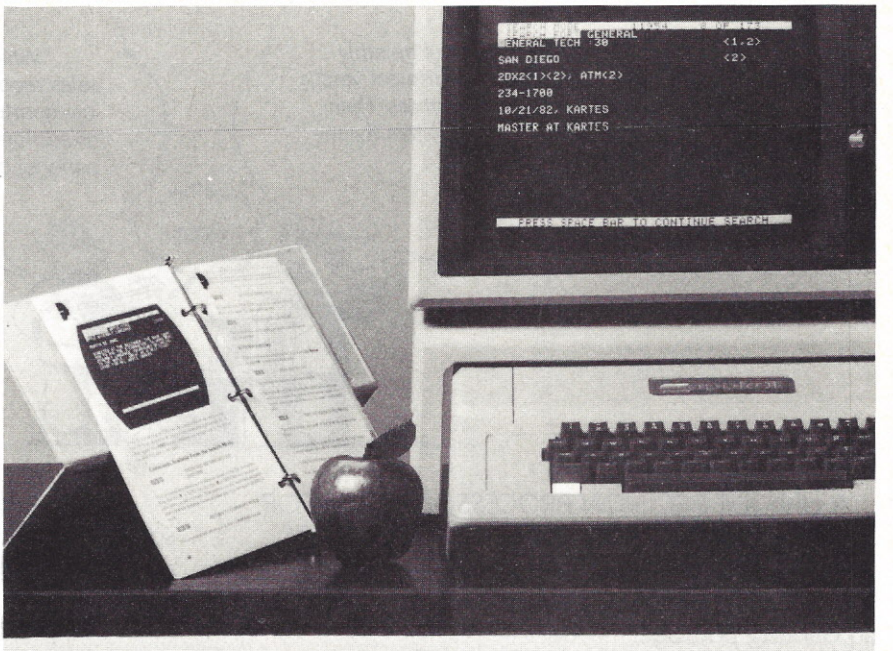
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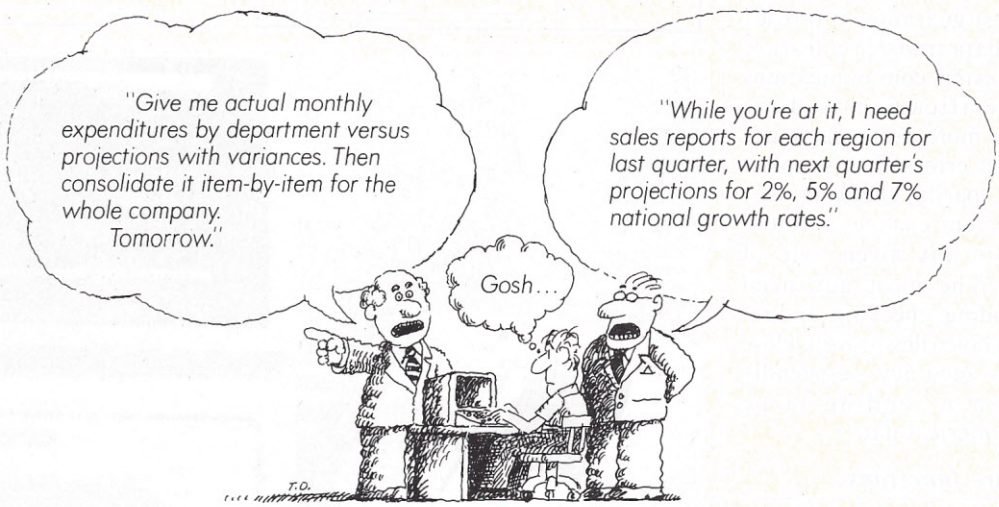
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CIRCLE 61

SSM Microcomputer Products, which allow you to forego many of the help features once you become familiar with the program.

Some advanced software combines several functions into hybrid programs. For example, Context Management Systems's MBA program includes software modules not only for telecommunications but also for word processing, business graphics, financial analysis, and data-base management. This program's communications module must be evaluated in the light of the usefulness of other modules for you and your needs.

In the end, you may wind up with two or more communications programs: a simple one for quick messages, and an elaborate one for electronic mail and for sending files requiring the tight accuracy of verified transmission. No single do-all communications program exists yet.

With the appearance of communications hardware and software, each passing week makes data communications more profitable and versatile for the user. Even the postal service is getting into the act with an electronic mail service that could become very handy for businessmen.

Your investment in communications software will likely run $300 or more for practical business uses. Less will do an adequate job if your needs are simple. However, you could spend $1200 before leaving the realm of data communications on ordinary phone lines.

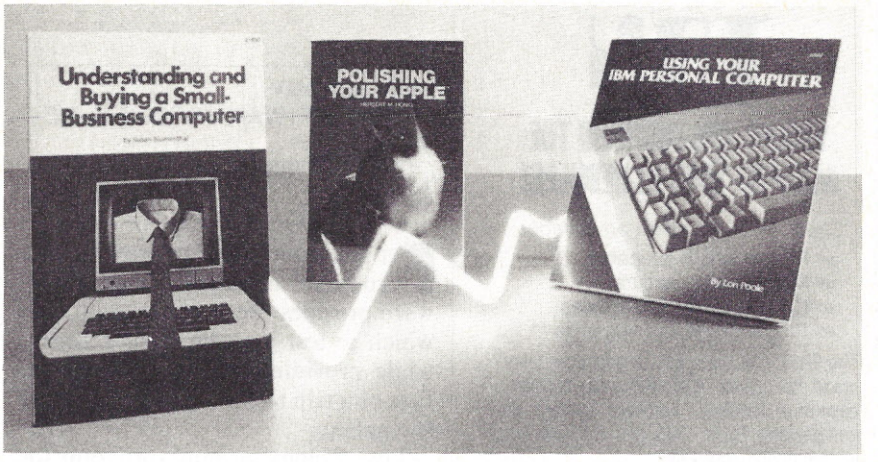
The overall advantages of data communications are the rapidity of information access and transferral, the convenience and economy compared to Express Mail or courier services, and greater return on your investment in the computer itself.

In short, communications hardware and software are providing means for linking personal computers into an extensive network that spans the entire country—wherever telephones can be found.

COMING IN FUTURE ISSUES

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Lost Colony, a game program for the TRS-80 Models I and II, the Atari 800, and the IBM Personal Computer, is a simulation of the economic affairs of Earth's first remote space colony, Warren's World. You, the game player, are elected economic manager of this fantasy world. You must manage the entire space colony's economy until assistance arrives from Earth.

The economic activities of the colony are divided into five broad industries: farming, mining, energy, manufacturing, and transportation. Your overall objective is to fabricate enough industrial machinery to expand the economy faster than the rate of population growth, while producing enough consumer goods to keep the workers satisfied. If you succeed, you remain in office. If you fail, you're voted out of office.

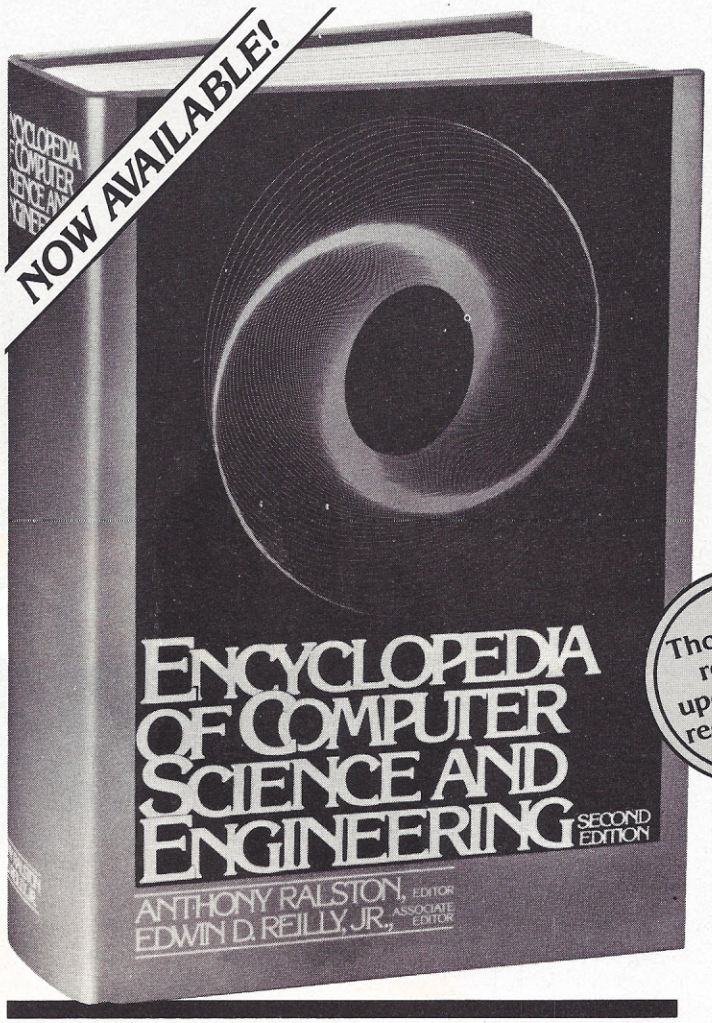
The farming industry produces food for the colony. The mining and energy industries yield all of the raw materials for steel, glass, plastics, and electricity. These raw materials are consumed by the manufacturers who produce consumer goods, robots, and heavy machinery. The heavy machinery is used by the transportation industry to explore and settle new areas of Warren's World.

To keep the economy healthy, there are several areas in each of these industries over which you have control. These include the size of the work force, and several factors that collectively determine the productivity of the workers. Production sites, the standard of living for the industry (or the rate of pay), and the amount of capital equipment assigned to each industry are some of these factors.

To increase the production in a given industry, you have a few choices. First, you may assign more workers to that industry. Second, you may allocate more robots to the industry, although there are some limits on the number of robots that can be used efficiently in each industry. Third, you may raise the wage rate in an industry. This increase may have some short-term benefits, but you must be careful that your action doesn't produce some unfortunate long-term consequences. For example, transportation workers may threaten to walk off their jobs if you raise the wage rate for farmers. In addition, if the disparity in the wage scale becomes too great, you'll be voted out of office.

In the early stages of the game, all workers accept a minimum living standard. As the game progresses, however, the minimum living standard—below which unrest is generated—rises steadily. A table of this minimum is included with the game documentation.

Let's briefly review the major steps of game play. At each turn you are asked to make decisions for that "year" of game play. First, you must allocate the available labor force for farming, manufacturing, and so on. Likewise, you must allocate available robots to these industries. Your next task is to distribute consumer goods to pay the workers. (The standard of living for each industry is propor-



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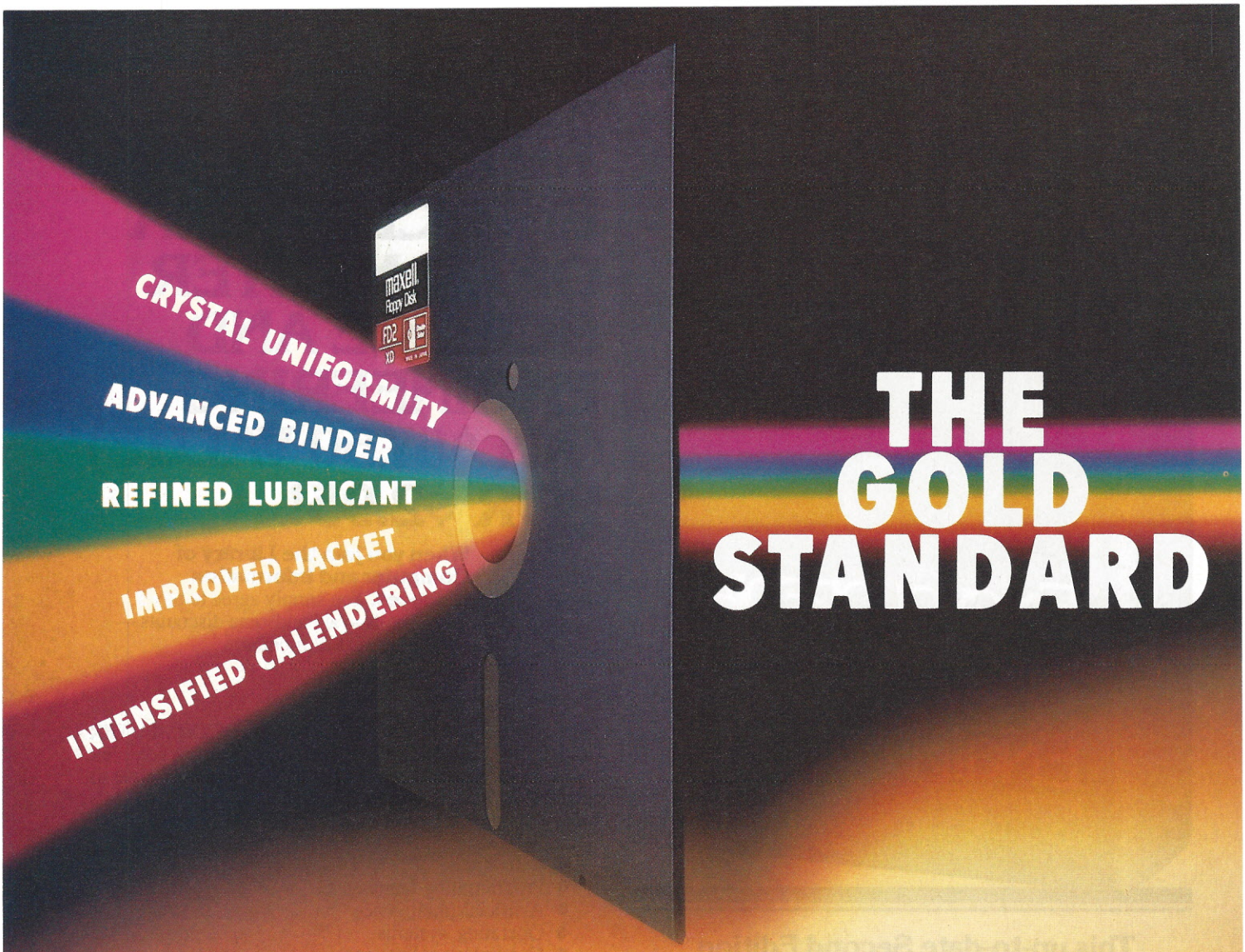
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CIRCLE 81

tional to the number of consumer goods per laborer.) Then, if there are production excesses in the mining and energy industries, these may be stockpiled. (There is a fee of $1 for each stockpiled unit, which is deducted from your cash supply.)

Your next task is to determine a tax rate for the year. A higher rate will generate more immediate revenue, but this could have an adverse effect on the economy in the next time period.

The final two decision areas over which you have control are exploring and settling new territory. Maps of Warren's World are displayed on the screen to assist you. If the on-screen transportation report shows a positive number for exploration, you have the option of dispatching explorers to look for new mineral and energy sources. These explorers are reliable, but they're not infallible. Although they will never report non-existent resources, they may overlook some. Similarly, if the transportation report shows a positive number for a settlement, you have a chance to move into new territory. When you do settle an area, you'll discover any resources not found by your explorers.

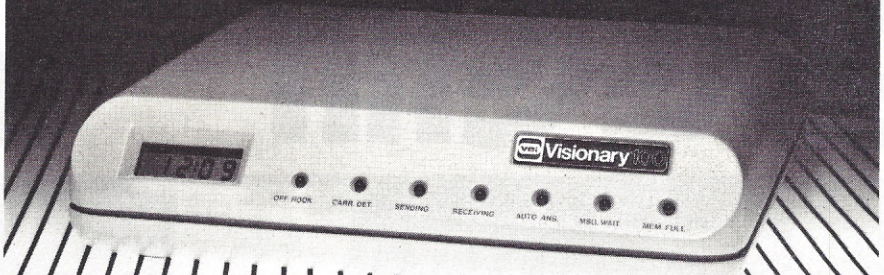
At the end of each year, you are shown year-end reports for each industry, which are used as a basis for planning your decisions in the next year. The reports can be called up at any time during play.

If you find you don't have time to complete a game and analyze your current economic condition at one sitting, it is possible to save a game at any point during play, providing you have allocated the workers and robots for that turn. The game status is saved to disk, and can be recalled in order to continue the game.

But continue you will. Lost Colony is both challenging and worth adding to your computer-game library. The game documentation even provides clues to help you successfully manage the colony and retain your position.

—Thomas Throop

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CIRCLE 83

THE COMPUTER ARTIST

(continued from page 74)

to think of what I could do in new ways—there are so many new possibilities."

DeMarinis sees using the personal computer as creating a form of music that actually hearkens back to the original spirit in which music was enjoyed several centuries ago. "In the 19th century, Western music became very formalized as to roles—who was composer, who was conductor, who was listener, who was performer. Those rigid roles did not exist in Western music before—in fact, the tradition with chamber music was for small groups of people to get together in each other's homes and play for their own enjoyment more than for an audience. Even composers such as Rameau and Mozart designated portions in their compositions to be improvised. The formalization of roles probably came about because of the large orchestra. Such a huge number of people playing together had to be coordinated by a conductor, and the performers had to play from some finished composition so that it would sound good.

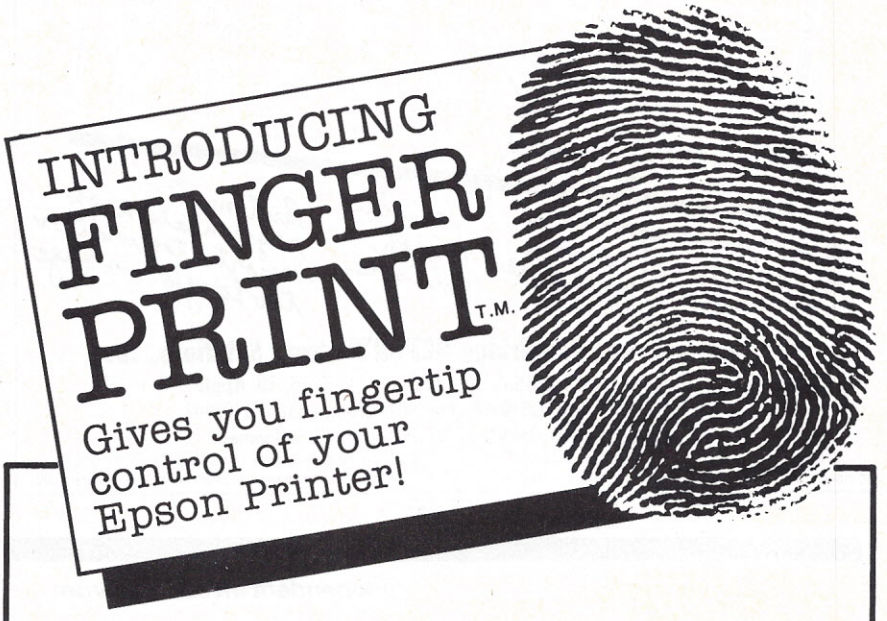
"When I started using the personal computer, the interactive nature of the new medium immediately made me want to break down those roles. And as soon as I broke them down for myself I wondered, 'Why should I be the only one to enjoy this?' "

Will DeMarinis and Tannenbaum ever collaborate on a work that joins their computer-aided media to create a tour-de-force of kaleidoscopic variations of dance and color with spontaneous musical accompaniment? "I hope so!" exclaims DeMarinis. "We've been wanting to for a long time, but there are not many places like the Exploratorium that can fund such an adventurous commitment to time and equipment." Declares Tannenbaum: "The big problem now is the width of the country between us. I don't know when, but sometime for sure!"

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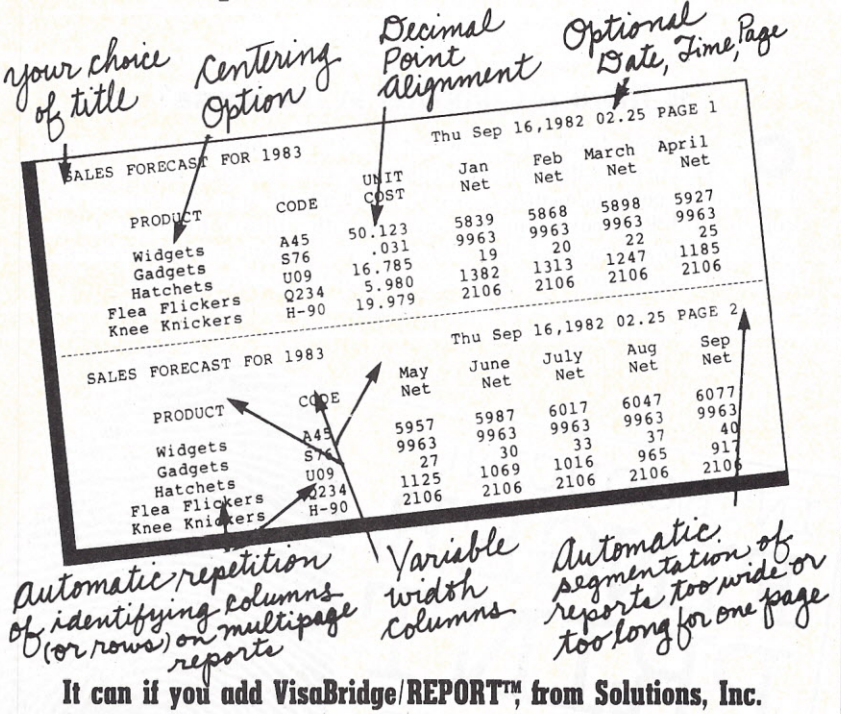
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CIRCLE 72

FIGHT AGAINST POLLUTION

(continiued from page 79)

Montague says, is a full-time battle, and sharing the wealth among the allies is a prime way to lead the charge. To that end, he uses his Cromemcos to process mailing lists for kindred organizations, such as the New Jersey Reporter, an environmental magazine, for his cost plus 10 percent.

It is Montague's aim to ultimately use the computers to bring together as many environmental groups as possible, and open up the often clogged information arteries that have kept citizens' groups from being as informed as they must be, much as he and Fact-Finder did for the League of Women Voters last November. He took another step in that direction recently, when he put out a list called The New Jersey Citizen Hazardous Waste Network Directory, that he culled from his data base of community action coalitions.

He plans to follow this with the development of an interactive data base, a system that would allow him to use his personal computer as a data bank that people could tie into by telephone, to swap information about hazardous wastes or any other pressing environmental issue.

To Montague, his struggle as an environmentalist is not significantly different from David's brawl with Goliath. Only brains and the most modern weaponry will defeat the brawn imposed by industrial interests on the environmental battlefield.

In the end many of Montague's battles are still being fought. Even with his masses of organized data, Montague has little to look forward to but ongoing litigation and hearings, which in the case of environmental issues tend to drag on sometimes for years. Montague feels that by using his computers he is at least in a position to keep up with the endless batteries of lawyers and data which the industrial interests are preparing to toss at him.

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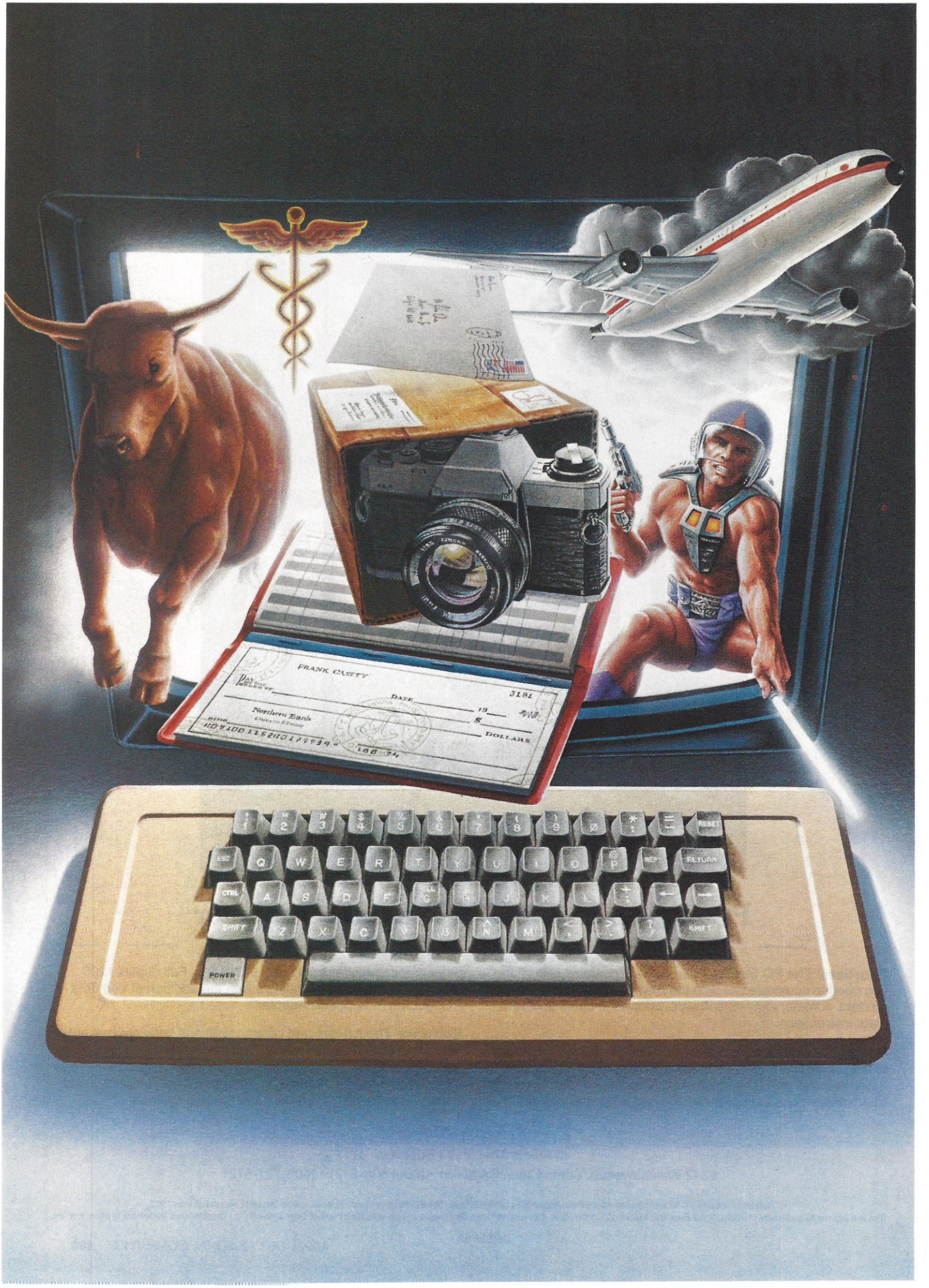
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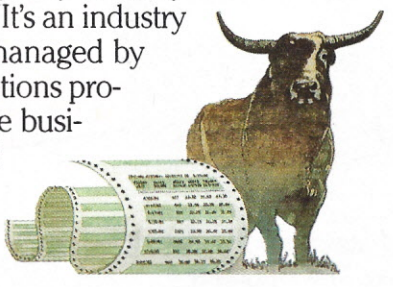
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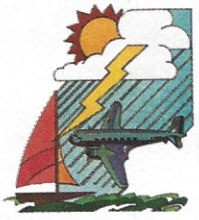
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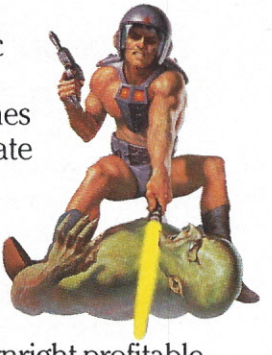
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CIRCLE 90

"I want to be master of my own castle. The computer can be your servant."

CONTROL YOUR HOME

(continued from page 62)

puter hobbyists. One of these is Tom Jefferson.

Jefferson grew up in Tuscaloosa, Ala. at a time when the schools were still segregated. Since he was a black student, he didn't have access to many of the best scientific laboratory facilities. Still, he says, he was so interested in science, and so good at it, that his teachers prevailed on the powers that were to get him access to nearby college and university labs. One of his science-fair projects was so good it won him a scholarship to Stillman College, one of the institutions whose labs he had used. "Some kids just slapped together a project for a science fair the night before it was due," he remembers. "But not me. I used to work all year long on the things, just because I liked them. My biggest project was a closed ecological system, a model of something they were working on at the Marshall Space Flight Center. I simulated the atmosphere of Mars, and showed that gray lichens could live in that atmosphere. I got all kinds of awards for that, but couldn't enter it in national competition, because, being black, I couldn't enter it in state competitions."

Jefferson studied computer science at Stillman, and it was then that he began to investigate personal computers. After he graduated and went to work in the data-processing department of Republic Airlines in Minneapolis, he financed a TI 99/4, but found it wouldn't do what he wanted to do, so he took it back to the store. He read the specifications for an Apple II, and bought it. "I could get down to the component level," he says.

Like Mosher, Jefferson began computing with applications other than home control. "I wrote a database manager," he says, "because I just didn't want to work with cassette tapes for storing data. Then when I bought a disk drive, so I could have all that information readily accessible, I thought, 'Wow, now I'm really on my way.' That's when I started working on home control.

"I think of myself as a planner, and so the first thing I did was plan the whole project with a flowchart. I don't know if you've ever heard of this, but I can dream about a project in my sleep. I see myself turning screws or whatever. Then when I wake up, all the preliminary work has been done and all I have to do is assemble the project.

"I knew from the start that I didn't want to run wires all over the house. I knew there had to be a better way. I read somewhere that BSR had a patent on a new chip that signaled things through the house wiring and I thought, 'That's the key.'"

Jefferson decided to use the BSR ultrasonic controller. But he had to have a way to get signals out of the Apple and convert them to ultrasonic frequencies, so the BSR unit could understand what the Apple was saying. He decided to write an assembly-language routine to do that, because using an assembler he could get the speed he needed. In Jefferson's view, assembly-language programming isn't difficult on the Apple. "I just use a disk assembler," he says. "You boot the assembler, then write the program as if you were in BASIC, but you're using assembly language, of course. The language is a little complicated until you get the hang of it.

"I wrote a program," he says, "that pulses the game I/O port in a pattern that the BSR controller can understand. Then I bought a transducer (essentially a loudspeaker) and built that into a piece of hardware that could chirp at the controller. That way I had achieved communications with the BSR unit without running wires at all. I don't have any pets, so the ultrasonics weren't a problem and I think these frequencies are above that threshold anyway."

Jefferson's next step was program development. He wrote a BASIC program that would allow the computer to duplicate the BSR console's functions, basically "on-off" on command from a central location. After that was done he added timing to the program so that things would happen in sequence. The timing program gives the home-control system the capability of running the house for a period of several days without human intervention. Timing also lets Jefferson run some functions for specified periods of time. "I can run a tape cassette for 45 minutes before going to bed," he says.

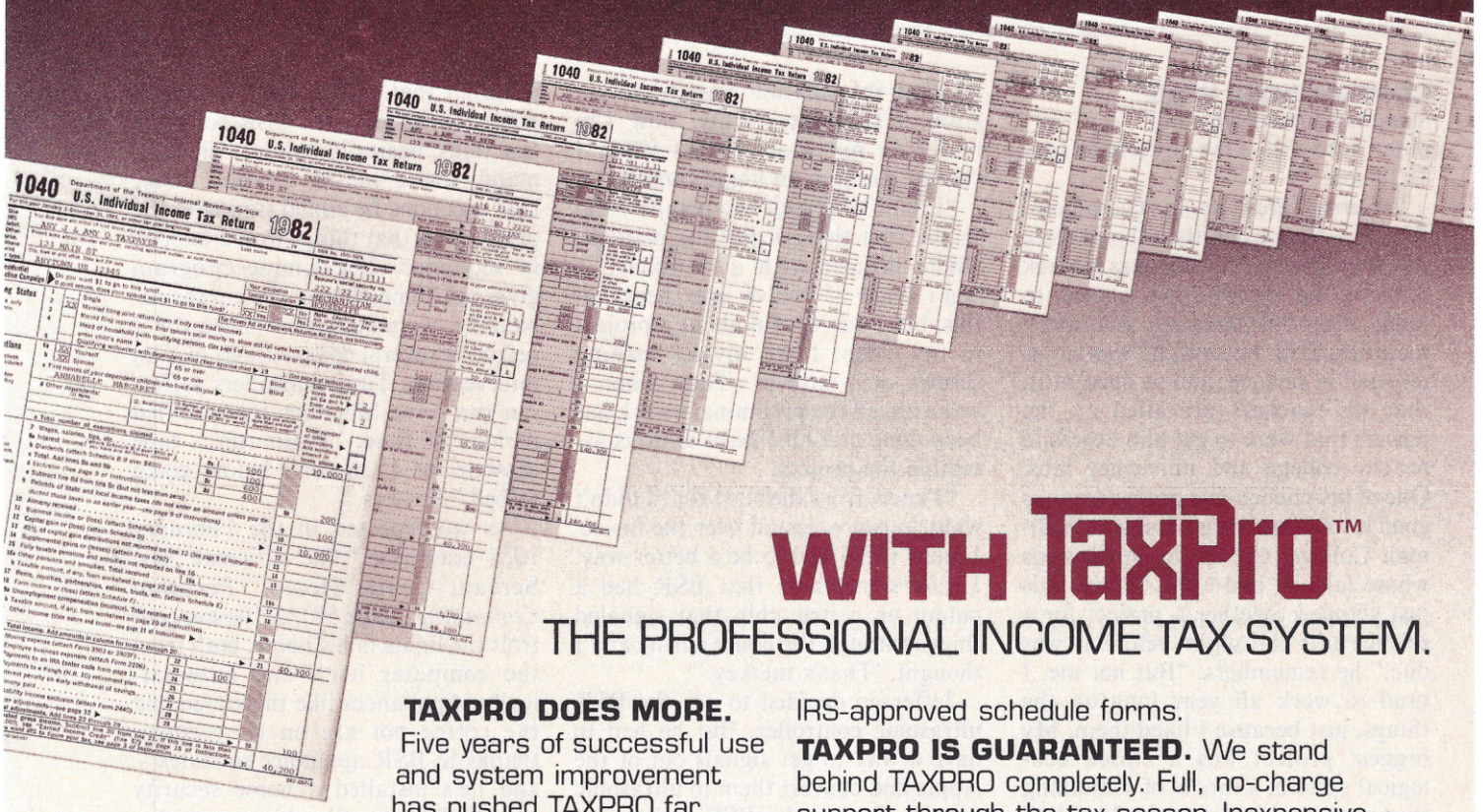
As we reported in the February 1981 issue (see "The Efficient New Servant Comes Home," *Personal Computing*, page 58), Jefferson controls the lights in his home, both from the computer itself and automatically. Appliances like the stereo and the coffee pot are on the system, thanks to BSR appliance modules—and he's installed a home security system. Details of hooking up such a system are contained in *The Apple Connection* (Sybex, Inc.).

But Jefferson reasoned that it would be nice if he could have several things happen at once. He wrote what he called macros to handle this. In programmers' terms, a macro is a collection of several instructions that are executed by a single command. Jefferson's macros will turn lights on and off at various times, depending on what he's doing or preparing to do. As we reported in February 1981, for example, he can put the house in a state that's receptive to visitors by turning front lights on and turning other lights off.

The talking controller

Since then, Jefferson has added voice synthesis to his system. By integrating the synthesizer from Street Electronics with the speakers he has around the house, Jefferson has the computer tell his children when it's reveille. "Josie and Tommy," the computer will say, "it's time to get up now." Jefferson says he had a lot of

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CIRCLE 127

fun with the neighborhood ghosts and goblins on Halloween. His computer used the voice synthesizer to intone, "I am Darth Vader, and you must follow my instructions. . ." The kids loved it.

The computer also uses the voice synthesizer in connection with the security system and a modem. If security is breached it can call the police.

Back when Jefferson started—early 1980—he had no choice but to go through the effort of writing his assembly-language program and pulsing the game I/O port, using those pulses to "chirp" at his BSR controller. But now things can be different. He reports that now the Thunderclock, from Thunderware of Oakland, Calif., has an ultrasonic interface to the BSR controller, and even a program called The Scheduler that allows users to program the Apple II to run a home control program in background. Background, a term that comes from the data-processing world, is one of the partitions in a partitioned memory, the other being called foreground. Some central-processing units can switch between a program in background and one in foreground, thus appearing to run two programs, both at the same time.

"Today," says Jefferson, "you don't need technical knowledge at all to get into home control. All you need is creativity. Lots of people buy a computer to do a particular thing and that's as far as they go. But some have a more creative approach—the dawn of a new reality. You used to have to run a lot of wires around the house and use A-to-D (analog to digital) converters, and that's relatively hard. But now anybody who has a personal computer can do it. (See the sidebar on page 60 for a list of computer-interface module manufacturers for the BSR X-10 system.)

Jefferson's system isn't a simple one. He has the Apple II with 64k of RAM. He has a Micro Buffer from Practical Peripherals in slot one, a MicroModem II from Hayes in slot two, and a Videx 80-column card in slot three. He also has the keyboard enhancer from Videx, because he wanted the ability to define keyboard macros. Slot four alternates between a real-time clock from Mountain Computer and the Softcard from Microsoft. If Jefferson wants to use CP/M, the Softcard gets inserted, otherwise it's the clock. Jefferson has a two-drive disk controller in slot six, and an RGB-monitor interface card in seven. This card, which has to be put in slot seven because that's the only I/O slot on the Apple with the color burst and synch signals necessary for the monitor, drives an Electrohome RGB monitor. Jefferson also has a monochrome monitor from NEC.

I/O slot five contains the interface to the Mountain Computer's Expansion Chassis, in which Jefferson has installed his Soundchaser card, which allows him to pursue his music hobby. Also in the expansion chassis are a ROMPLUS card from Mountain, with which he can install "custom" cards and Mountain's music system.

That's a lot of hardware, but of course Jefferson didn't do it all at once. He started with his investigations of the BSR controller. "There was some literature I read," he recalls, "but I don't remember what it was. I know I read about the functioning of the BSR custom chip. But really it was almost all self-investigation—I did a lot of experiments with a multimeter—and self-study. The thing just kind of grew."

Jefferson's work has brought him recognition in the local press, and he's been featured in his company's internal newspaper. As a result of that he recently took over a new job, coordinating the integration of personal computers into Republic's operations.

That's not bad for a man who says, "I just kept asking myself, 'What else can I do with it?'"

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ALL Four Modules	1000	605
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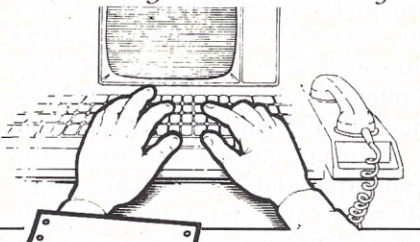
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CIRCLE 95

New Computers Promise Increased Ease Of Operation

Each month Personal Computing *scans the hardware market to keep you up to date on everything that's new. Those products we consider to be most useful and exciting in this month's crop are described in this section and commended for your closer examination. Others are listed in the index.*

IN THE APPLE //E, "E" STANDS FOR ENHANCED

If Apple let you create the replacement for one of the world's most popular computers—the Apple II Plus—what would you do? If you were Apple, you'd try to design a comfortable computer, for openers. It wouldn't be the fastest, but it would access most of that sea of software and hardware made for the Apple II Plus. It wouldn't have every feature imaginable—but for its rather modest price tag, it would show painstaking attention to useful, practical details. And if you were Apple, you'd name it the Apple //e.

The "e" stands for "enhanced," a word Apple has made good on. From keyboard to game port the new machine is designed to wear well with professionals and businessmen alike. Some high points:

- New keyboard similar to the Apple ///'s.
- Full upper- and lowercase characters.
- Optional 80-column display identical to the Apple ///'s.
- Accessory slots on back with provision for adding sockets.
- External game control socket.
- 64k RAM.
- Second 64k option (for 128k total memory in two 64k banks).
- Cooler-running design; in most cases, no fan is needed.
- Novice-oriented manual and training software.
- Optional word-processing and file-management programs.

All the Apple //e's features—combined with excellence of execution—suggest the character of a good walking shoe; it lets the wearer focus on his journey instead of his feet. The keyboard follows this philosophy. There's nothing fancy—even a 10-key numeric pad is a plug-in option. But like its big brother the Apple ///, it's a keyboard with a light, accurate key action. Its convex plane lets one's fingers move from top to bottom row without changing hand position. Large command keys—SHIFT, CONTROL, RETURN, etc.—foster rapid typing, as does a DELETE key placed where the BACKSPACE key goes on an IBM Selectric typewriter. The design contrasts sharply with the IBM Personal Computer's multitude of keys. Adherents of each layout will argue the IBM's versatility and detached low-profile keyboard against the Apple's more forgiving arrangement and greater resemblance to the classic Selectric, but that's what makes horse races.

The computer's back side shows more of the Apple //e's commitment to refinement and continuity. Slots allow for Apple II-style cabling; but accessory sockets can be added easily. The cover snaps off, as before, but now can also be screwed down. For extra security, the computer can even be bolted to a table.

Open a running Apple //e and a red light inside will warn you to turn off the computer before altering anything. The motherboard (main PC board) features one-

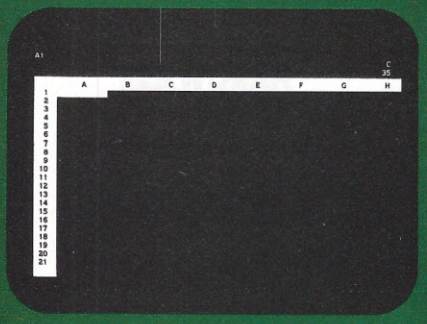


The new Apple //e personal computer features built-in 64k RAM, an upper- and lowercase character set, and a new design that makes the machine run much cooler than the Apple II Plus.

third the chips of the Apple II Plus for cooler operation—and no need for a fan as long as there's some room around the computer. We filled our test machine with accessory cards and ran it for 96 hours without problems. The absence of a fan made it quieter, too. If difficulties arise, a special slot lets dealers plug in a tester that can pinpoint problems down to two or three chips. With so few chips doing so many functions, though, it may be harder to find

(continued on page 195)

VISICALC*



INTERACTIVE ELECTRONIC WORKSHEET **YES**

ON-LINE REFERENCE GUIDE **NO**

"NAMING" OF CELLS OR AREAS **NO**

PLAIN ENGLISH PROMPTS **NO**

INDIVIDUAL COLUMN WIDTHS **NO**

EXTENSIVE FORMATTING CAPABILITIES **NO**

PROTECTED CELLS **NO**

MULTIPLE, LINKED WORKSHEETS **NO**

SORTING CAPABILITY **NO**

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Compare ease of use. All Multiplan prompts are full length words or phrases. And Multiplan provides "naming," the ability to assign a plain English name to any cell or area. "Gross Profit = Sales—Cost" rather than "AA44=AZ23—BK154." Which means you can work more intuitively. And faster.

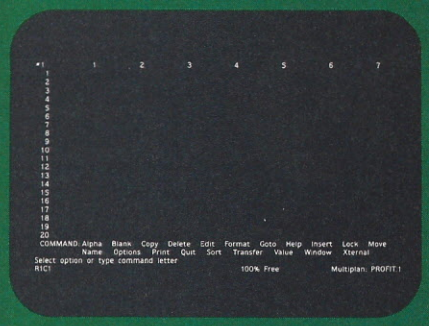
Compare utility. Multiplan lets you link related worksheets so that information is transferred between them automatically. For instance, you can keep regional sales forecasts on separate sheets but link them with your overall company forecast. Then, just change the forecast for any region, and the company forecast sheet is updated automatically. Something you can't do with first generation worksheets.

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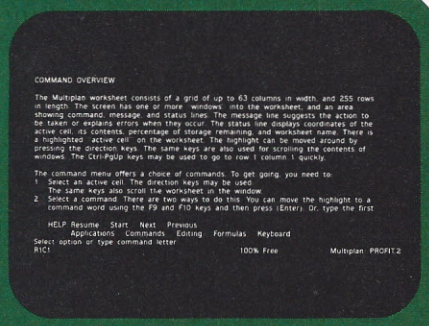
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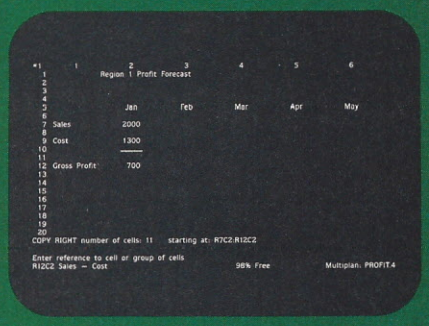
INTERACTIVE ELECTRONIC WORKSHEET **YES**



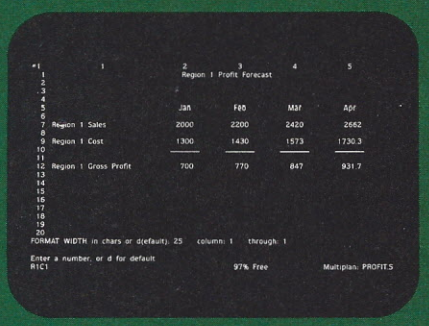
ON-LINE REFERENCE GUIDE **YES**



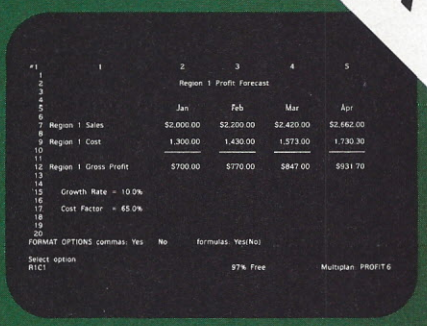
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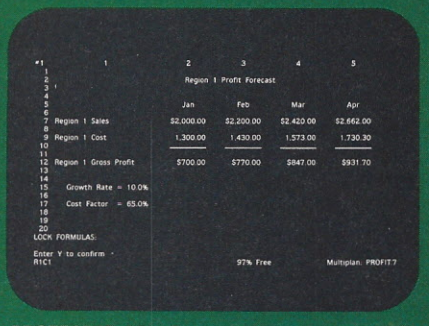
PLAIN ENGLISH PROMPTS **YES**



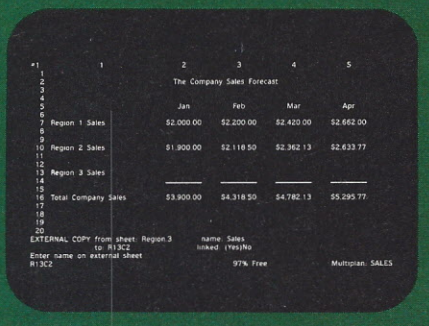
INDIVIDUAL COLUMN WIDTHS **YES**



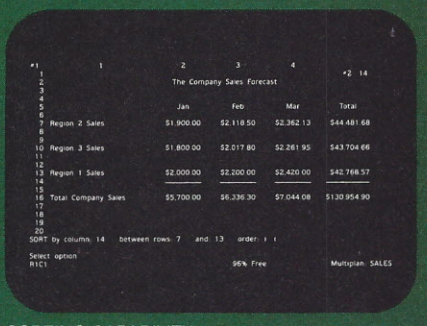
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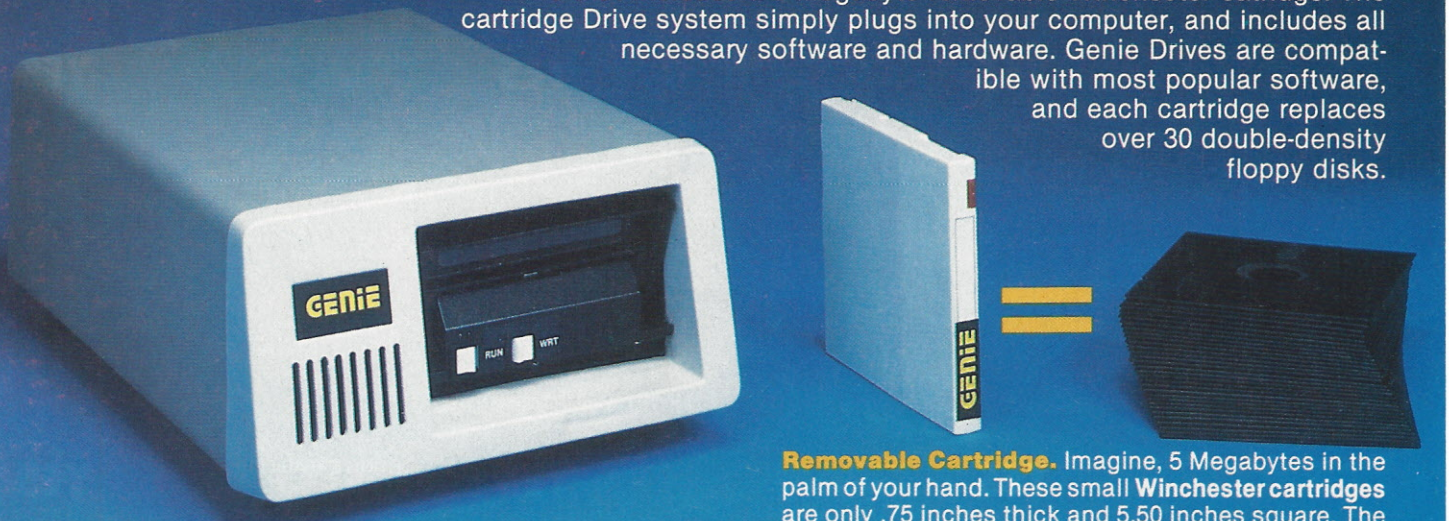
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CIRCLE 92

(continued from page 191)

add-ons (like a type-ahead keyboard buffer device) that modify motherboard operations.

The extra 64k RAM option comes on an alternate 80-column card. The computer's 6502 processor can only access one of the two 64k banks at any moment, but bank-switching software can store the program in one bank and the user data area in the other.

The Apple //e's manual and tutorial diskette will walk a first-time owner through the computer's basic functions. The diskette uses computer-assisted instruction techniques and extensive animation. One first-grader went all the way through it with only a tad of adult help.

Apple is introducing word-processing and data-base management programs with the Apple //e. They resemble equivalent Apple /// programs, but they won't run on either the Apple II Plus or the Apple ///, even in Apple II emulation mode which has not been changed to accommodate the Apple //e. Files can be converted for use on the Apple II, however.

Apple Writer // (not to be confused with Apple Writer II for the Apple II Plus) allows the editing and print formatting typical of word processors. It also provides for creating form-letter templates. One enhancement over Apple Writer /// is the overlay cursor, which moves over text without displacing characters.

Quick File // can store 150 to 250 average-size "file cards"—300 to 700 on the 128k version. Files must be in RAM for sorting. Disk-based programs like PFS from Software Publishing hold more records, but sort through them more slowly, since disk access takes much longer than RAM access. Quick File generates reports in tabular or mailing label format and can create Apple Writer-compatible files.

The Apple //e console costs $1330; a starter system is $1995 with console, monitor, stand, disk drive, and some extras. The extended 80-column board with 64k RAM costs $295; 10-key pad is $160; Apple Writer // costs $195; and Quick File //, $100. The monitor, disk drive, and DOS remain unchanged for now.

FOR MORE INFORMATION: APPLE COMPUTER INC., 20525 Mariani Ave., Cupertino, CA 95014.

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CIRCLE 89

case suits it to living rooms and professional offices alike. And it's small—at 2½- by 12½- by 15-inches, one can fit even on a crowded desk. A new line of similarly compact peripherals is coming out over the next year to accompany it, too, so that complete systems will stay small. However, peripherals for the Atari 800 will work with the model 1200XL as well.

If you use a standard television set for your display, a signal splitter lets you flip between antenna/cable reception and computer reception. Television monitors will plug right in, too—there's even a special socket for RGB (Red-Green-Blue) monitors, with their saturated colors and high resolution. Other computers often need to be modified to run RGB monitors.

You plug your first peripheral (such as a printer) into the socket on back; successive peripherals daisychain to each other, in any order. Game controls (or the optional ten-key pad) plug into the side, as do program cartridges. You don't have to switch off the machine before inserting a cartridge.



The priorities in the design of the Atari 1200XL were simplicity of operation, foolproofing, and features users need most.

The first time you turn on the Atari 1200XL you'll want to run the built-in diagnosis. Just press the HELP key. You can choose all or part of the full 7½-minute cycle, which goes over just about everything inside the computer; it can even pinpoint problem chips for quick repair.

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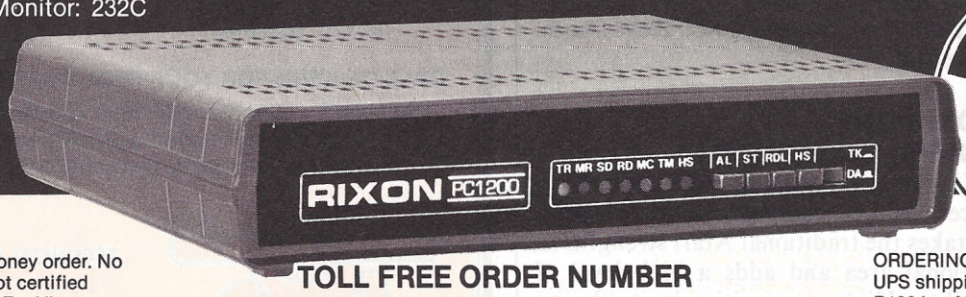
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CIRCLE 97

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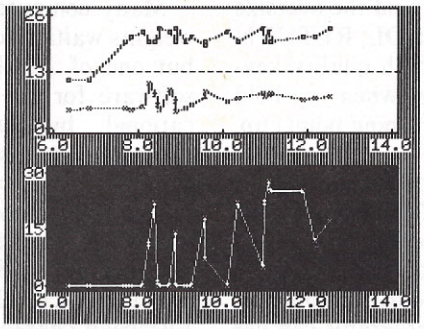
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STATPRO currently runs on the Apple® II and Apple III personal computers. It will soon be available for the IBM® PC.

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CIRCLE 74

Your 40-column 24-line display shows full upper- and lowercase characters with true descenders (the little tails on letters like p, q, and y). Several graphic modes let you display up to 128 colors at once—even scroll the graphics smoothly. You can display larger-than-normal text fonts, too.

When you start to type, you'll appreciate the uncomplicated keyboard layout. Fingers easily find the oversize command keys (such as SHIFT, CONTROL, RETURN etc.). And you'll enjoy the feel of the high quality keyswitches, which shift to automatic repeat when you hold them down. Four keys move the cursor (typing point) up, down, and sideways.

Above the regular keyboard is a row of flat metal keys that engage with a firm, springy feel. The HELP key is one of these, as are four special multifunction keys, which let you pop the cursor from side to side and/or top to bottom of the screen, switch the keyboard to a graphics or a European character set. Application programs can use the four multifunction keys for program-specific purposes, along with the HELP key. The other keys on the model 1200XL work like those on the Atari 800.

A new built-in speech generator creates human voice quality as lifelike as that of a small radio—good for queries and comments in programs. Otherwise the Atari 1200XL continues the 800's 3½-octave, four-voice music abilities—even with the built-in speaker.

Many computers start out as little more than paperweights waiting for software. But the 1200XL will run all but one of Atari's current, rapidly growing library of software for the Models 400 and 800, including educational, business and recreational programs. The exception—a disk-based word processor—is being replaced by a cartridge due to appear shortly.

The 1200XL will cost $899. Three new peripherals are due with it: the small 1010 cassette-based program recorder for $99.95; the 1025 80-column dot-matrix printer, which will print the 1200XL's full American and European character sets at 40 characters per second, at $549; and the 1040 40-column printer/plotter, using 4½-inch wide paper and costing $299.

FOR MORE INFORMATION: ATARI INC., 1196 Borregas Ave., Sunnyvale, CA 94086; (408) 745-2000.

—Lee Thé, Technical Editor

GEMS OF WISDOM

Ingenious Indentation

Our problem was with a mailing-list program which would always begin printing in column one. This is fine for making labels, but we wanted to address envelopes directly—they were bonded to continuous-form computer paper—and needed to indent about three and one-half inches. Our software didn't allow this, and of course there was no way to modify this off-the-shelf software.

The trick to solving our dilemma was to set the left margin on the printer with a one-line BASIC command before loading the mailing-list program. Then, without shutting off or powering down the printer, we can load and run the mailing-list program, and our left margin remains set from the previous "program."

This same technique can be used to set margins, tabs, character size, and any other features which your printer will allow you to set by sending control characters through BASIC.

Jay S. Oberfield
HYATTSVILLE, MD

This Gem of Wisdom wins $25 for Jay Oberfield. If you have an anecdote, a tip, a secret to share, send it (up to 250 words) to Gems of Wisdom Editor, Personal Computing, *50 Essex St., Rochelle Park, NJ 07662.*

MAD DESIGN FOR THE FUTURE

The MAD-1 computer, a product of Mad Computer, Inc., is a futuristically styled system designed to run a new generation of software. It's a multitasking system featuring Modular Advanced Design, a term used to describe the internal architecture as well as the external configuration.

The MAD-1 has four basic low-profile units—Data Module, Computing Module, keyboard, and display station—that can be arranged according to user preference. Internally, there are two board slots for additional functions in the CPU module and four in an expansion module. Features planned for the future include networking, math processing, and typewriter-oriented processing.

The modularity of the system reduces heat buildup, which afflicts systems built as a single unit. It is also aimed at simplifying service, allowing problems to be quickly located, and allowing dealers to swap boards to minimize work interruption.

The MAD-1 has an Intel 80186 processor with 128k RAM. The Data Module, measuring 12.5 by 15 by 2.3 inches, houses half-height disk drives. Users can choose one floppy drive or two, or one floppy and one hard disk drive. The display station can be adjusted up and down and side to side; it has a non-glare amber or green screen. The detached keyboard is one-half inch high along the operator's edge; it has palm rests and sculptured key caps.

(continued on page 203)

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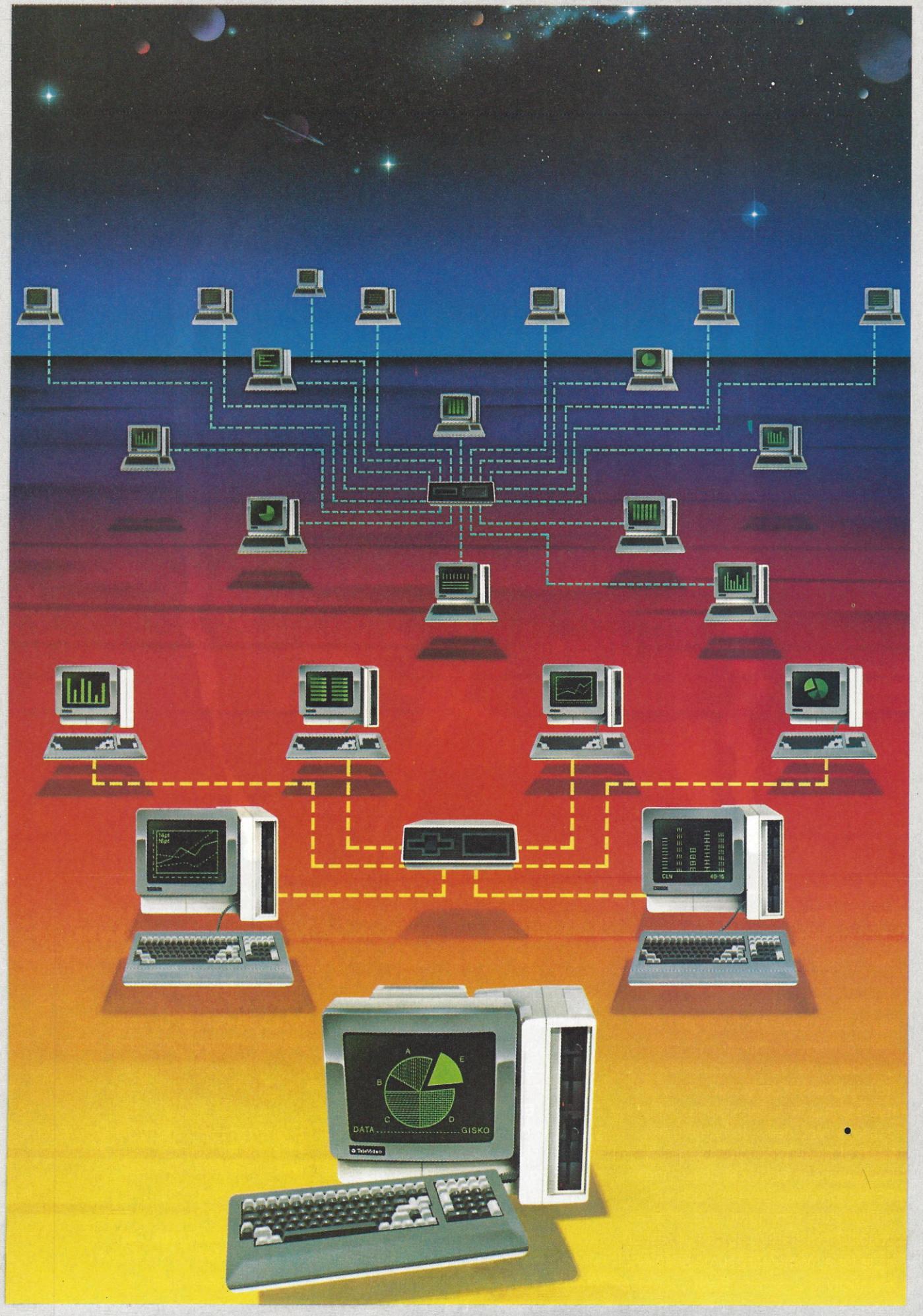
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CIRCLE 31


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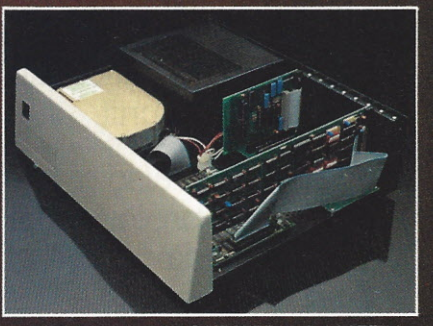
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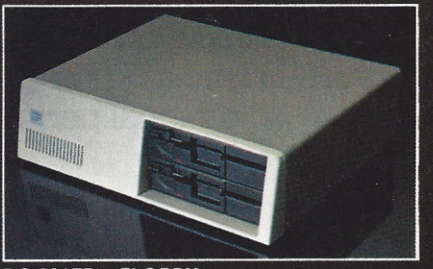
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CIRCLE 17

(continued from page 198)

The system is IBM-compatible and operates on concurrent CP/M-86 and MS DOS, allowing access to a large library of software. The suggested retail price for the MAD-1 ranges from $3000 to $6000.

FOR MORE INFORMATION: MAD COMPUTER, INC., 3350 Scott Blvd., Santa Clara, CA 95051; (408) 980-0843.

HARDWARE INDEX

A COMPREHENSIVE LISTING OF NEW PRODUCTS

SYSTEMS

PRODUCT/FEATURES/PRICE	COMPANY/AVAILABILITY
Aquarius home computer with maximum memory of 52k, and the ability to display up to 256 different characters on the user's t.v. screen $200	Mattel Electronics Hawthorne, CA 90250 retail CIRCLE 460
Atari 1200XL offers 64k RAM, 12 user-programmable function keys, and built-in diagnostics $1000	Atari Incorporated Sunnyvale, CA 94086 retail CIRCLE 461
Athena I battery-powered portable featuring 512k of solid state storage, may be connected to local networks $3950	Athena Computer & Electronic Systems San Juan Capistrano, CA 92675 mail order CIRCLE 462
Codata 3300 68000/UNIX-based system—includes 5¼-inch Winchester disk drive and 320k of parity-protected RAM $9600	Codata Systems Sunnyvale, CA 94086 mail order CIRCLE 463
MAD-1 multi-tasking system featuring modular advanced design permitting the user to take only	MAD Computer, Inc. Santa Clara, CA 95051 retail CIRCLE 464

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Half/Full Duplex	Yes	Yes	Yes
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Fits completely inside Apple	No	No	Yes
Operates without additional serial interface	Yes	Yes	Yes
Touch-Tone® Dialing	No	Yes	Yes
"Single-Modem-Chip" Reliability	No	No	Yes
Audio Monitor	No	No	Yes
Self Testing	Yes	Yes	Yes
Warranty period	2 yr	1 yr	2 yr
Suggested Retail Price	$379	$389	$299

Trademarks: Micromodem: Hayes Microcomputer Products, Inc. Applecat II: Novation. ModemCard: SSM Microcomputer Products Inc. The Source: Source Telecomputing Corporation, a subsidiary of the Reader s Digest Association. Dow Jones News/Retrieval: Dow Jones & Company, Inc. Apple is a registered trademark of Apple Corporation.

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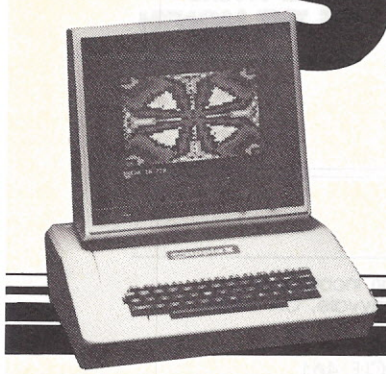
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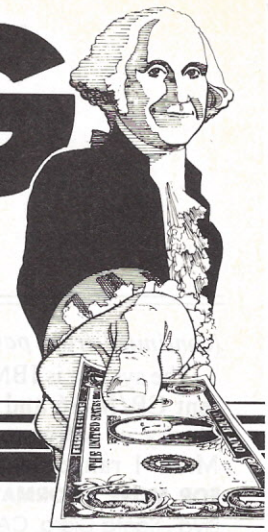
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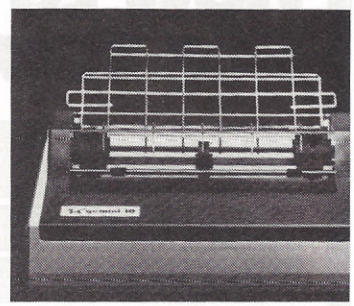
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System 816/A includes 8085/8088 CPU board and two 8-inch floppy disk drives $5495	CompuPro Oakland Airport, CA 94614 retail CIRCLE 467
VZ100 has 3k RAM and BASIC built-in; movable key keyboard to help unskilled typists avoid errors	Video Technology Elk Grove Village, IL 60007 mail order CIRCLE 468

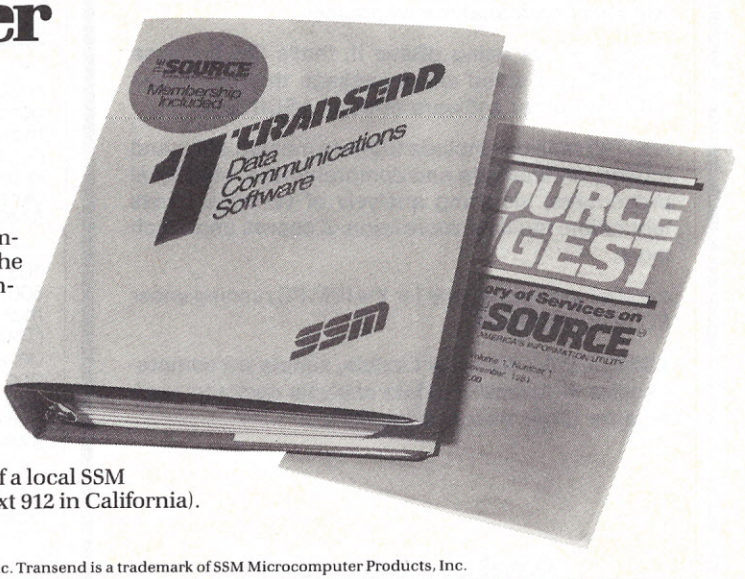
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ESF-20/64 consists of two units—miniature endless loop tape cartridge and direct drive transport mechanism; memory up to 64k for Commodore VIC-20 and -64 $199.50	Exatron Sunnyvale, CA 94086 mail order CIRCLE 469
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Amplot II six-color plotter featuring .002 inch resolution; receives ASCII commands $1290	Amdek Corporation Elk Grove Village, IL 60007 mail order CIRCLE 471

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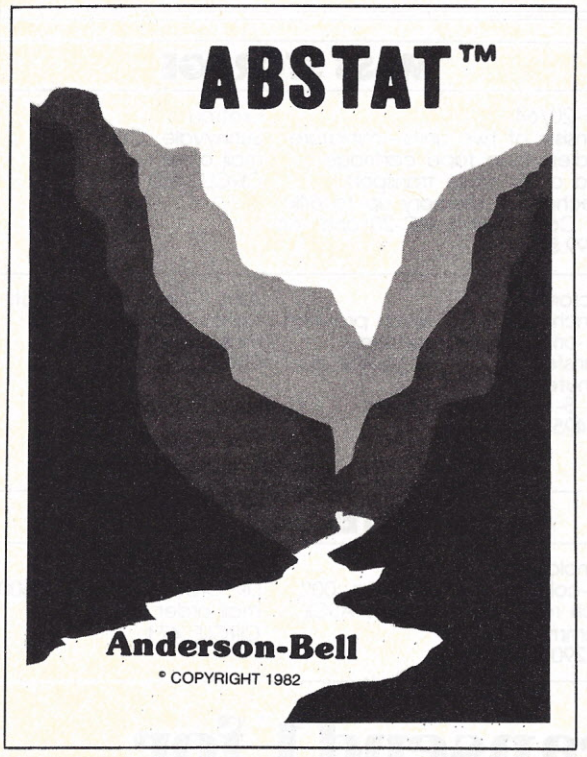
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CIRCLE 104

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retail
CIRCLE 477

USS 212A/D
built-in firmware allows entry and storage of up to five

Universal Data Systems
Huntsville, AL 35805
retail

(continued on page 211)



It's 2 AM. Your Apple II is sending budgets to New York; purchase orders to Boston; a contract to St. Louis; and correspondence to every field rep in the country. Automatically. Transend, from SSM.

Transend software opens the world of electronic communications to your Apple. From sending mail over the phone to connecting with information banks—the doors opened by Transend are practically unlimited.

Take electronic mail. SSM's Transend 3 lets your Apple correspond *automatically* over phone lines with *up to 100* Apples—at any hour you choose. Your Apple dials each phone number, transfers data electronically, verifies that the data was transmitted intact, and provides a complete call status report. Transend 3's password feature means only authorized users see sensitive information.

8:37 AM. Your Apple receives mid-morning sales reports from the Apple in your New York office.

Transend 2 lets your Apple correspond over the phone with other Apples. Error detection features guarantee the accurate transmission of your valuable data.

1:52 PM. Your Apple displays current flight schedules and connects you to a ticket agent via THE SOURCE℠.

SSM's Transend 1 turns your Apple into an intelligent terminal connected to your corporate computer, a timeshare system, or any information service such as THE SOURCE. (In fact, all Transend software includes a valuable subscription offer for THE SOURCE.)

You'll get business news, the most recent stock reports, advance UPI world news—even flight schedules—in moments. And new possibilities arise constantly.

11:53 PM. With the SSM Apple ModemCard™, your Apple is always ready to dial the phone.

SSM's 300 baud modem card fits conveniently inside your Apple. Advanced features include Auto-dial/Auto-answer for unattended operation, and Touch-Tone™ dialing (required for networks such as Sprint® or MCI Advantage™). The SSM ModemCard makes all other modems obsolete.

2 AM. The SSM Apple TimeCard™ lets your Apple work while you sleep.

The SSM Apple TimeCard lets your Apple Transend mail automatically at any hour. It keeps accurate time for other uses as well.

Need help?

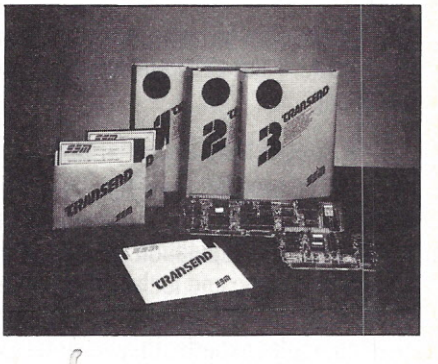
Simply Transend your question to SSM's 24-hour electronic message board. The next business day, your answer will appear on the board for easy reference.

"How do I Transend my Apple?"

Easily. Just go to your dealer for a flexible choice of SSM products. You can purchase easy-to-use, prepackaged hardware/software combinations, or separate components to fit your needs and budget. SSM guarantees your satisfaction or your money back.

SSM Microcomputer Products Inc.
2190 Paragon Drive, San Jose,
CA 95131 (408) 946-7400,
Telex: 171171 SSM SNJ

The Transend family from SSM: Transend 1 (intelligent terminal software that lets your Apple talk to virtually any computer, including information services), Transend 2 (software that lets your Apple send verified electronic mail to other Apples), Transend 3 (full-featured electronic mail software with automatic mailing capabilities), the SSM Apple TimeCard, and the SSM Apple ModemCard.



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CIRCLE 105



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(continued from page 206)

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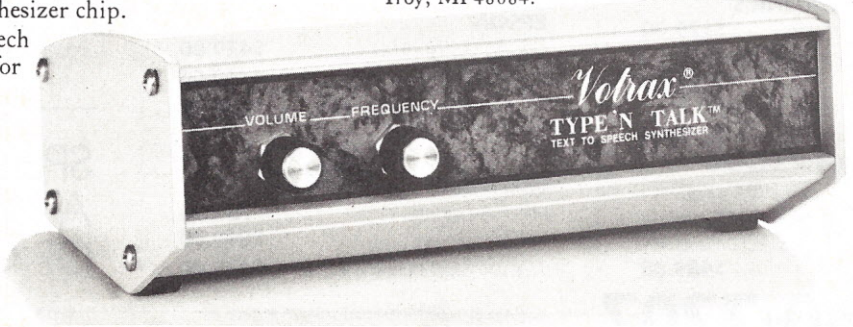
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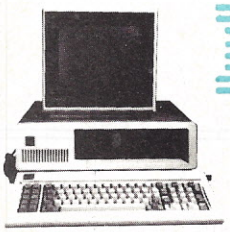
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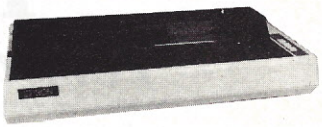
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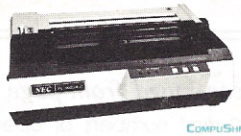
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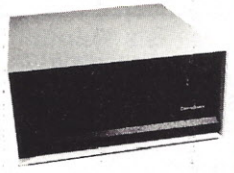
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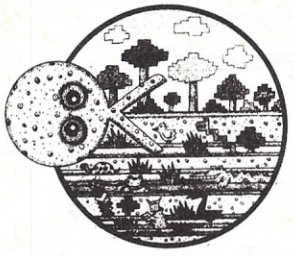
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(continued from page 211)

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(continued on page 218)

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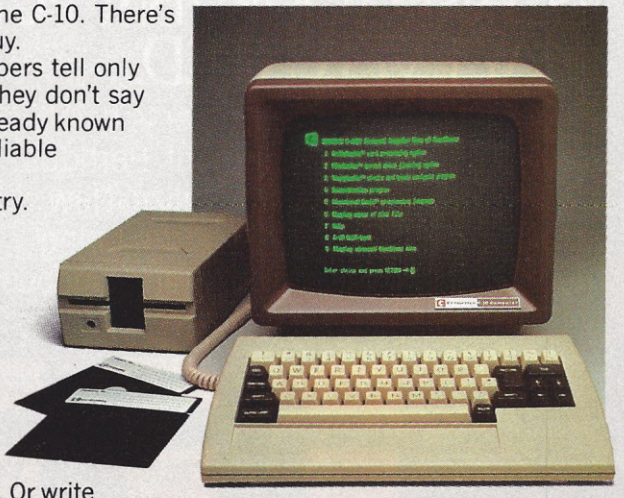
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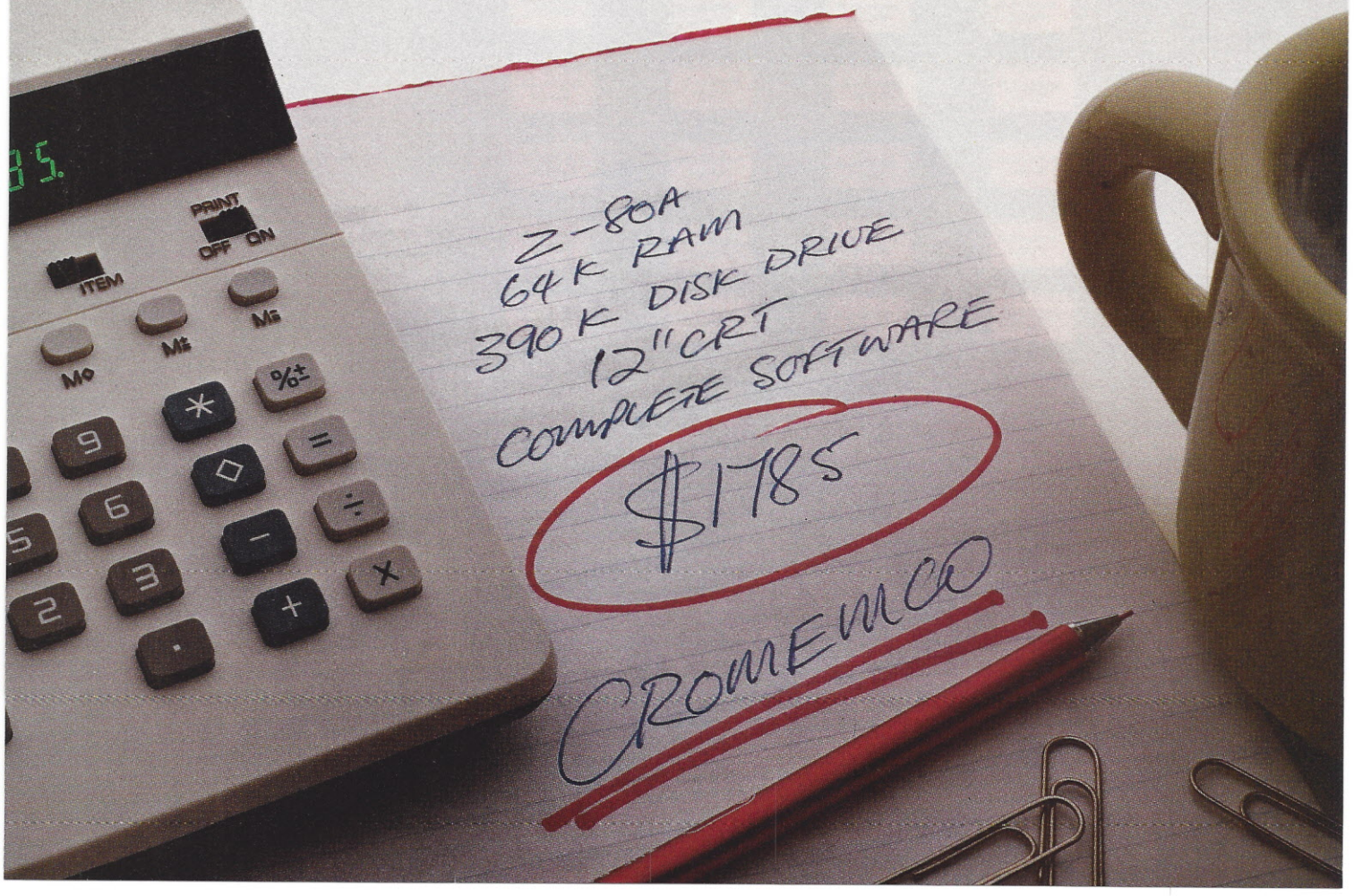


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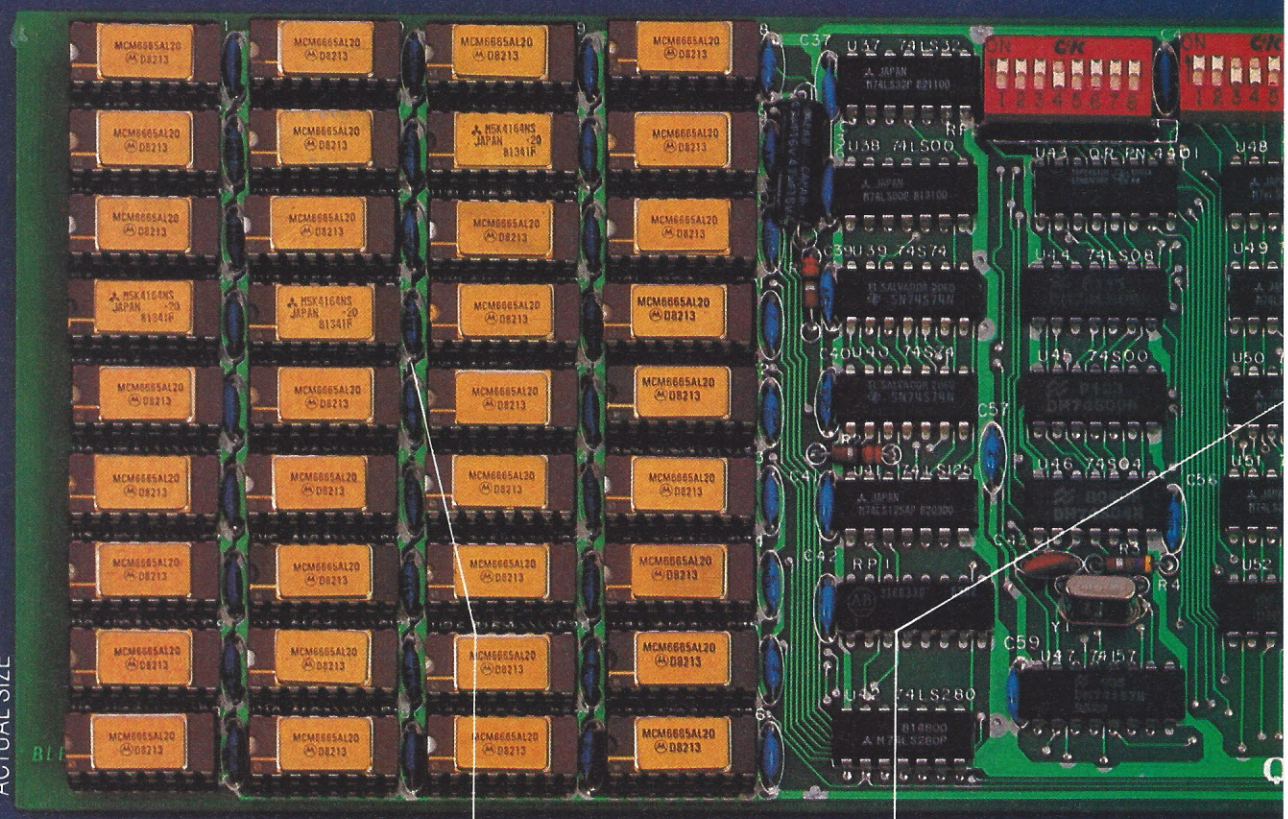
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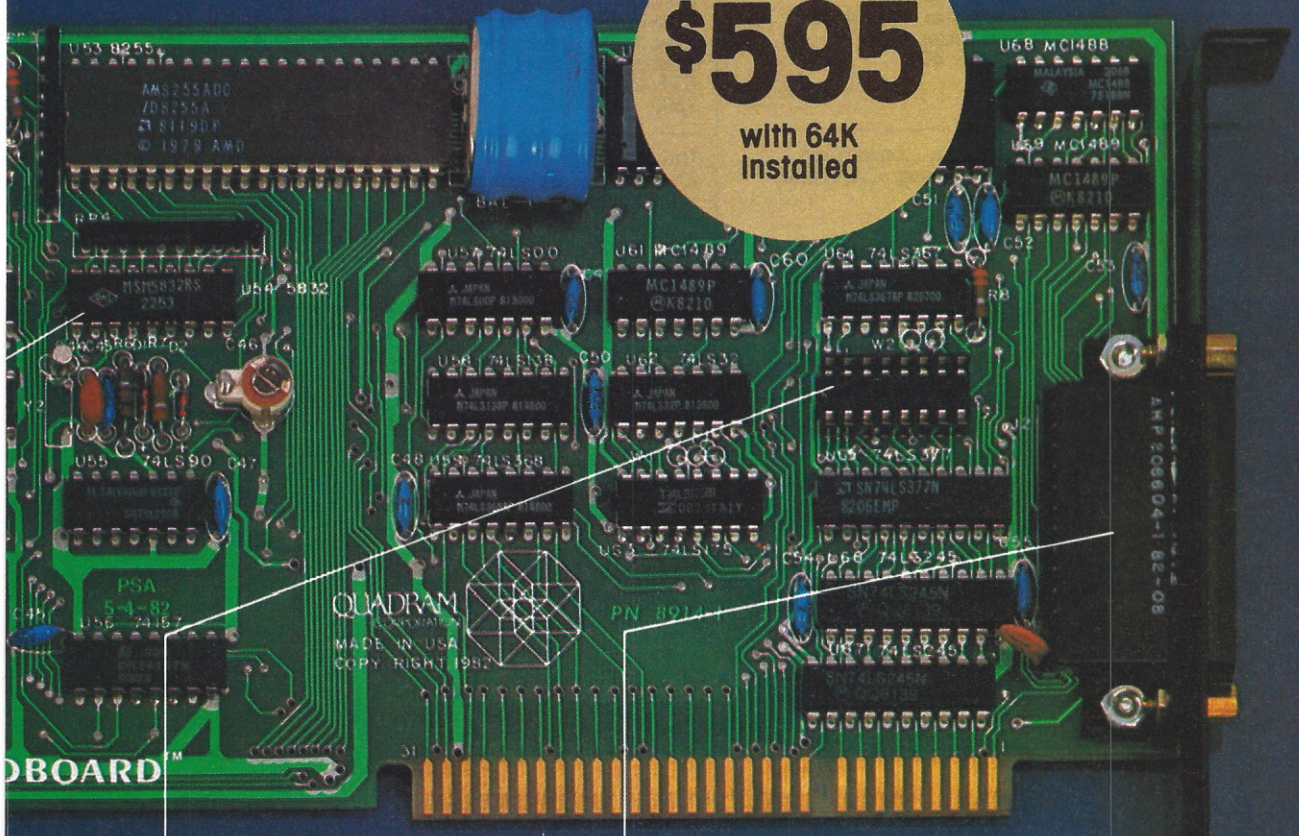
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(continued from page 214)

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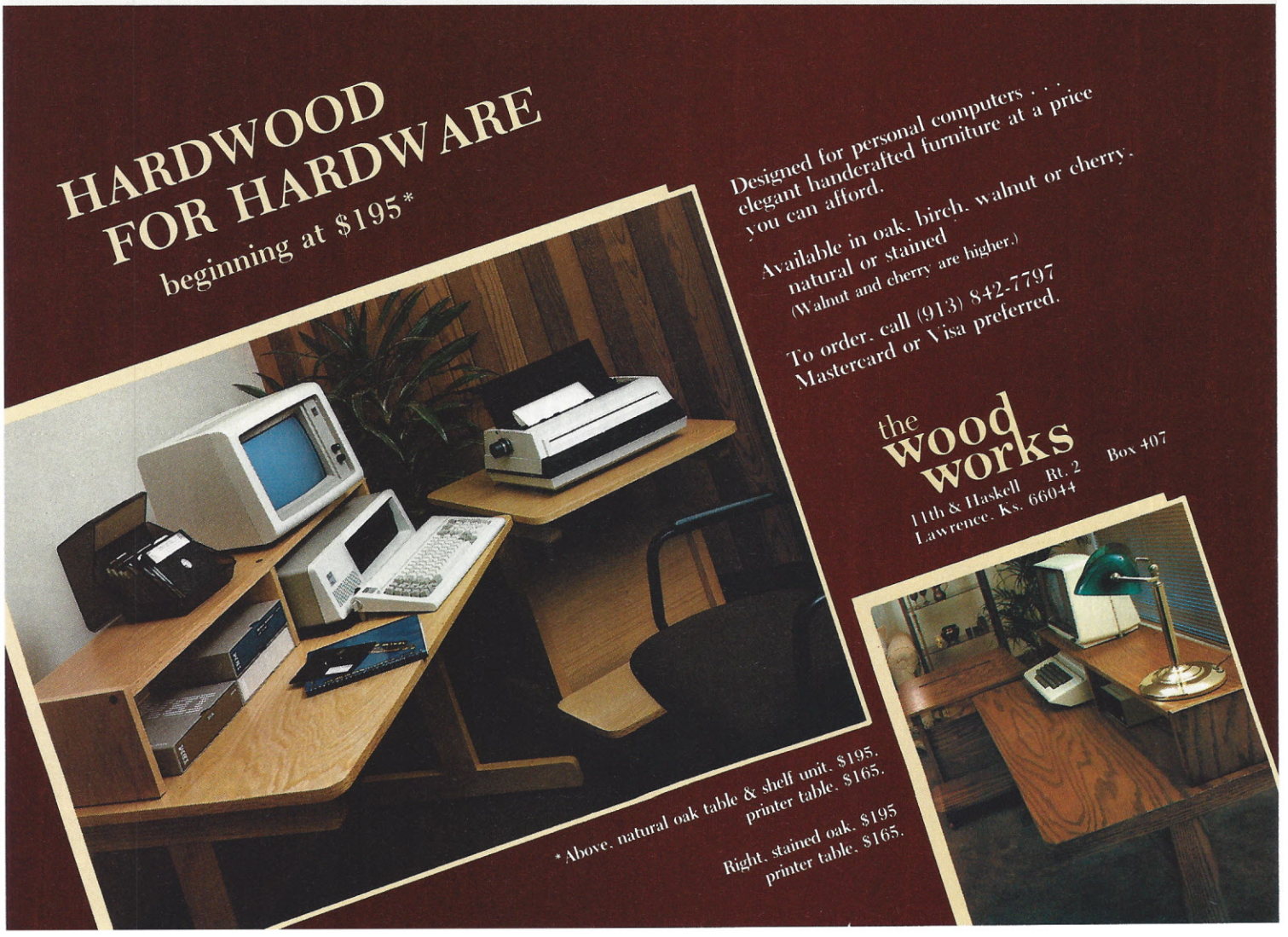
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"The older fellows have done it the hard way for so long, that as soon as we recognized the power of the computer, we jumped right on it."

THE BOSS BROKE THE RULES

(continued from page 68)

According to Lee, Tripp "dug up some Corps of Engineers' algorithms and wrote a program so that he could tell what size boxes he should use on overseas shipments, based on U.S. data. He wrote it at home, while watching TV and playing with his cat.

"This is an example," Lee continues, "of where the older fellows actually used the computers faster than the younger ones. The younger fellows who had the courses in college knew how to program, but they didn't have the business experience to really know where to use the computer. The older fellows—myself included—have done it the hard way for so long that as soon as we recognized the power of the computer, we jumped right on it. We have the business experience to think up the problems where we can use it. That point," he adds with a touch of annoyance, "isn't brought out in anything I've ever seen." That may be because of the firm belief among those who are supposed to know those things, in the inviolability of the following rule.

Executives resist using computers; they are intimidated by terminals and are unlikely to ever become completely comfortable with them.

Lee began by supplying computers to his technical staff, and then introduced them to the rest of his organization. "I gave one to the vice president of finance," he says, "and even though he has this big computer with three million megabytes of disk space, I gave him one to take home. He began working with analysis pads, switched to VisiCalc when it became available, and started to do all the financial modeling on it. I had been trying to get him to do this on the big computer, but he started doing it on the TRS-80 and he went berserk"—presumably, with joy.

Actually, only two company executives and staff members balked at the notion of using personal computers. One was Rolf Mast, director of research and product manager for consumer products. "He has a Ph.D. (in chemistry) from a British university," Lee says, "and he was the one who was most outspoken. He said that he didn't think we should waste our time typing, and 'doing' computers; we should have secretaries to do that."

"Basically," Mast recalls, "I had some reservations about typing my own reports—because I couldn't type. Also, at the time, I hadn't worked directly with computers myself, and I was very uncomfortable about what computers could do, so I was hesitant to use them. I couldn't type and didn't want to type, and I didn't understand computers at all. I made the point that the secretary does have some advantages, not the least of which is that the secretary could type a report a lot quicker than I could. Also, I do a lot of outside correspondence. I was very leery about being able to prepare letters and other documents of suitable quality for external consumption, and I made that feeling known."

Clearly, some sort of compromise was in order. Lee agreed that if Mast would do his weekly reports on the computer, his secretary would continue to do his correspondence—for the time being.

Mast's first step was to master the keyboard. "I still do the hunt-and-peck," he admits, "but a lot faster than my initial sorties." In response to a question about whether he was a two-finger typist, he mused for a moment and then said, "well, more like four-and-a-half." He quickly discovered that even hunting and pecking, he could turn out reports that were longer, more detailed, and more accurate than his non-computerized versions, in less time than he had been previously spending on them.

One afternoon, Mast needed a letter typed promptly, and his secretary was not available. "So I decided," he now says, "what the heck—I'd give it a try. After about half an hour of fiddling around, I finally got it formatted correctly so it made a presentable letter. I now have my own daisywheel printer and find it much more convenient, in fact, to type and edit my own letters and print them out immediately, rather than send them to a secretary or a typing pool."—especially letters containing long and complicated chemical names.

Like many executives, Mast used to write his letters in longhand for retyping. Often the typed versions had to be corrected or edited. "Typing and correcting on the word processor," he claims, "is about as quick for me now as writing things by hand. It would, in fact, take me more time to take a handwritten copy to the secretary and then to correct the secretary's typed version of it and recheck the corrected version."

At about the same time, Mast had a research project that was relatively simple in procedure, but required hundreds of tedious, time-consuming calculations. "We were trying to define, accurately, the shape of people's fingernails and the variations of different dimensions that we would have to allow for in order to build sets of artificial fingernails," he explains. "It was very routine and very simple. I described the problem to some of our systems analysis people who were developing the Basic Four system.

"At the same time," he continues, "I'd been looking over the BASIC program (for the personal computer)." He wrote what he describes as "an elementary program . . . and it worked out very well. It didn't change my mind an awful lot, but it did help in that particular instance."

What turned the tide for Mast was the discovery that a number of the laboratory personnel were using statistical-analysis software pack-

Form **1040** Department of the Treasury—Internal Revenue Service **U.S. Individual Income Tax Return 1982**

For the year January 1–December 31, 1982, or other tax year beginning

Use IRS label. Otherwise, please print or type.

Your first name and initial (joint return, spouse's name and initial)

Present home address (Number and street, including apartment number, or rur

City, town or post office, State and ZIP code

Presidential Election Campaign — Do you want $1 to go to this fund? If joint return, does your sp

Filing Status Check only one box.

1 ___ Single
2 ___ Married
3 ___ Marr
4 ___
5

Exemptions Always check the box lab Yourself Chec b

NOW, A NEW SELF-TEACHING PERSONAL INCOME TAX PREPARATION SYSTEM FOR YOUR HOME COMPUTER

HomeTax™
by Learning Shack™

Here's how you can get the first self-teaching personal Federal Income Tax preparation system for your home computer featuring AutoLearn™.

Prepare Your Tax Returns with HomeTax™

Imagine how easy it will be to prepare your 1040 Income Tax Return on your own computer using the Learning Shack™ HomeTax™ system. You don't have to be a tax expert and you don't need to purchase tax books or pay outside tax preparation fees. You don't even need a documentation manual with your HomeTax™ system because the user-friendly program will ask you all the questions that the professional tax preparer would ask, right on the CRT screen! You simply enter the answers and the program goes to work for you. It uses your computer to process the information and print the completed return on plain paper. A special 1040 transparency is included with the program which is placed over the printout and your finished tax return is made on a copy machine ready for your signature.

Your Personal Tax Planning System

In addition to helping you prepare your income tax return, your HomeTax™ program can be used in a "what if" mode to help you with tax planning. A "Tax Planning Strategies Manual" that you can use to project the tax consequences for different situations is included with your program. This can save you many times the cost of the HomeTax™ System!

Your HomeTax™ program is also compatible with another user-friendly system available from the Learning Shack™ called HomeRecord™ — a system that allows you to record current expenses throughout the year and provides you with monthly financial information which automatically flows into the HomeTax™ system at the end of the year.

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When you use the HomeTax™ system, you get more than a computer program. You get a complete tax service! If you have any questions regarding the preparation of your income tax return when using the HomeTax™ system, just give us a call. Our technical staff will be on hand to answer any tax questions you may have. In addition you will receive periodic news releases concerning important changes in the tax laws.

What About Next Year?

Every year there are revisions in the tax laws. Learning Shack™ will provide you, for a nominal charge, with annual renewal diskettes to update your HomeTax™ system which will reflect these new tax laws.

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CP/M IS A REGISTERED TRADEMARK OF DIGITAL RESEARCH

Your Computer System may be Tax Deductible

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Hardware Requirements

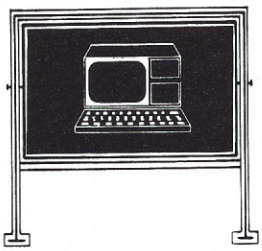
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DEALER INQUIRIES INVITED.

ages. He decided to try them on his own computer. "I had some data that I needed to analyze, and I found myself being able to do the statistical manipulations in a matter of moments. My previous experience had been to work through a 'statistical expert' who gave me the same results—after much backward and forward negotiation—several days later. I suddenly realized that with a few minutes' time and effort, I was able to do what used to be delayed by two or three days while somebody else got around to doing it. This began to change my mind about computers in a hurry."

One of the most effective applications of personal computing in Mast's bailiwick is in the marketing of new products. "A hundred-and-one different things need to be accomplished in order to develop a new product," he says. The timing of the product's entry into the marketplace depends on how well those things can be coordinated, ranging from delivery dates for raw materials and ingredients, to the timely availability of packaging materials. If any one element is delayed or changed, everything else is changed, too. There is little point, for example, in having expensive and space-consuming packaging materials on hand if a certain perfume suddenly becomes unavailable, or if stability and safety tests are delayed for some reason.

One day, Mast happened to read a paper that offered what he describes as "a very skeletal and not very useful" network analysis program. "I was able to take it and adapt it to my own purposes by putting input statements into it, a calendar analysis, and a few other things. I turned a 100-line program into a 200-line program, and I've been using it fairly routinely ever since, whenever I get into scheduling parameters." Now, the computer quickly accomplishes the massive recalculations that must be done whenever a variable changes. And how was this accomplished before the computer ? It wasn't.

Meanwhile, back in the lab, chemists are using VisiCalc to work out formulations. Mast, who once resisted computerization because he couldn't type, now talks about it as though it were ordinary, daily routine—which it is. "It's just a question of setting up the algorithm for the various constituents (of a product) to equal 100 percent. Then you put in the cost parameters, swap around ingredients and any algorithm you need if one ingredient has to stay a certain percentage. Any of these restrictions that you want to build into your formula, you build in. Then you play around with variations and look at the effect on costs and on concentrations of the ingredients just by making simple changes in the variables." A spreadsheet doesn't care what the numbers represent; a chemical formula works as well as a stock-market projection.

Computers are cold and impersonal; when they do the work, you lose touch with the work itself.

Rolf Mast is fully converted: "I've used my computer in my own way for things I never dreamed I would." Lee used to get monthly forecasts—"big, thick, unwieldy printouts," he calls them—from his Basic Four computer. Now he generates his own forecasts, based on updated information which he inputs every two weeks. "I love to enter the numbers myself because that way, they stick in my head. If somebody shows you a fait accompli," he claims, "it's not the same as if you put them in. You think about the numbers as you're putting them in—which a clerk doesn't do. Some things are too important to be left to clerks."

He does the same with his television advertising budget. "I like to check it against the operating statement," he says. "I have a little program that I wrote so I can see how it's doing graphically. Every two weeks, I just put two weeks of booking data in—and I think about it."

At first, Lee says, "I wouldn't let myself become a programmer." Learning to program would be demanding on his time. But in 1980 he decided to give himself a Christmas present in the form of what he considered then—and now—as a kind of personal advancement. Besides, he claims, "I was getting too much static from my programmers on the Basic Four. So I just worked through a couple of books and started writing my own programs for projects I had around the office."

He decided to abandon chess and photography, and put computing on a three-year trial as a hobby. He's still at it. Currently, he's hooked on "model simulation." After successfully designing one for an air pollution study for a nearby community, he is working on a method of predicting the effect of television advertising on company sales. He considers such projects his hobby. He works on them at home.

"Somebody high up in the company has got to be interested, and knowledgeable, and stay on top of it," claims Lee, "or you'll have chaos. You'll end up with three, five, or 10 different machines that don't talk to each other. You've got to have somebody make the decisions on what to standardize.

"As the president or vice president of a modern company," he admonishes, "you cannot turn your back on the biggest aspect of the industrial revolution since the start of the industrial revolution itself. I very definitely feel that you have to become computer literate to some point, even if you just go along to decide which one they're going to buy."

Lee is working on a "microcomputer setup" for the Western Society of Naturalists.

Another of his hobbies is "collecting" computer games for his 12-year-old granddaughter. She

owns a TRS-80. Guess who bought it for her?

Meanwhile, in the Mast household, a personal computer was installed within nine months after the machines were brought into the office. To be sure, Mast takes work home, but mostly, the Masts use the machine for personal tasks, like personalizing Christmas letters, and for community work. Husband and wife are both involved in scouting, and perform a variety of jobs on their computers on behalf of the local Boy Scouts. Their sons, 11 and 12, are being introduced to the computer slowly and carefully, because Mast wants them to understand what processes go on inside the machine.

For growth and expansion, it is essential to stay abreast of state-of-the-art technology. Upgrading is the name of the game and should be seen as a never-ending goal.

"Why should I upgrade?" asks Lee. "I keep reading about all the new computers—16-bit, 32-bit, four-million megabytes. I barely use my 48k."

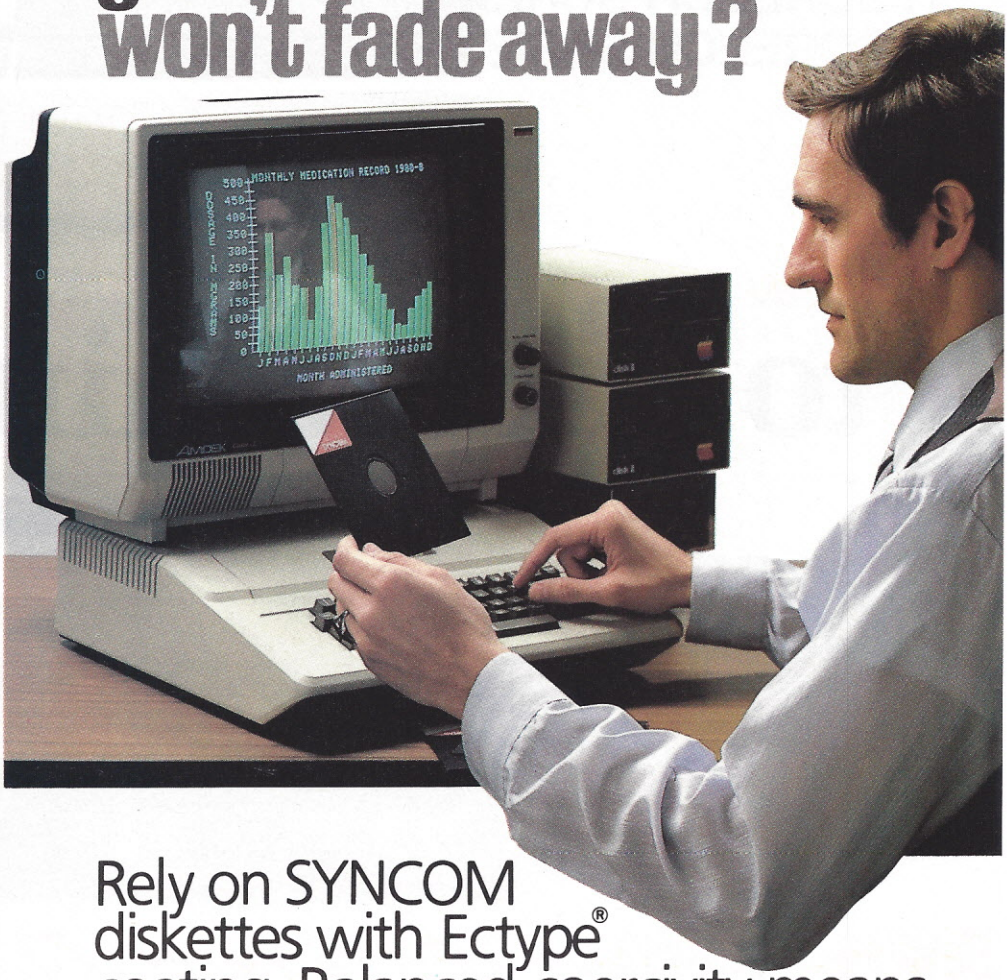
He has, however, initiated a process for increasing capacity: He uses the unused sides of single-sided disks. Every computer club—which is where he learned how to do it—has someone who knows the method.

In the meantime, he has managed, through the use of personal computers, to eliminate a half-dozen or so clerical and secretarial positions in his company, through attrition and transfers to other departments.

If you want to play the game, you've got to follow the rules.

Really? Try telling that to Henry Lee.

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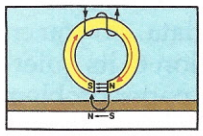
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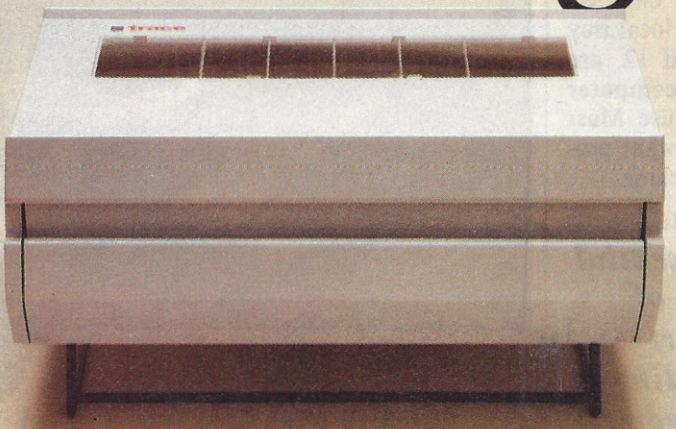
CIRCLE 50

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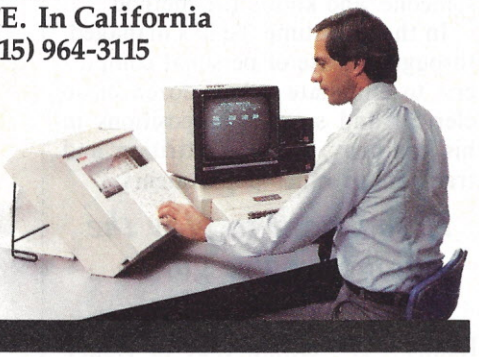
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SoundTrap with stand becomes a convenient data holder and paper organizer while saving desk space.

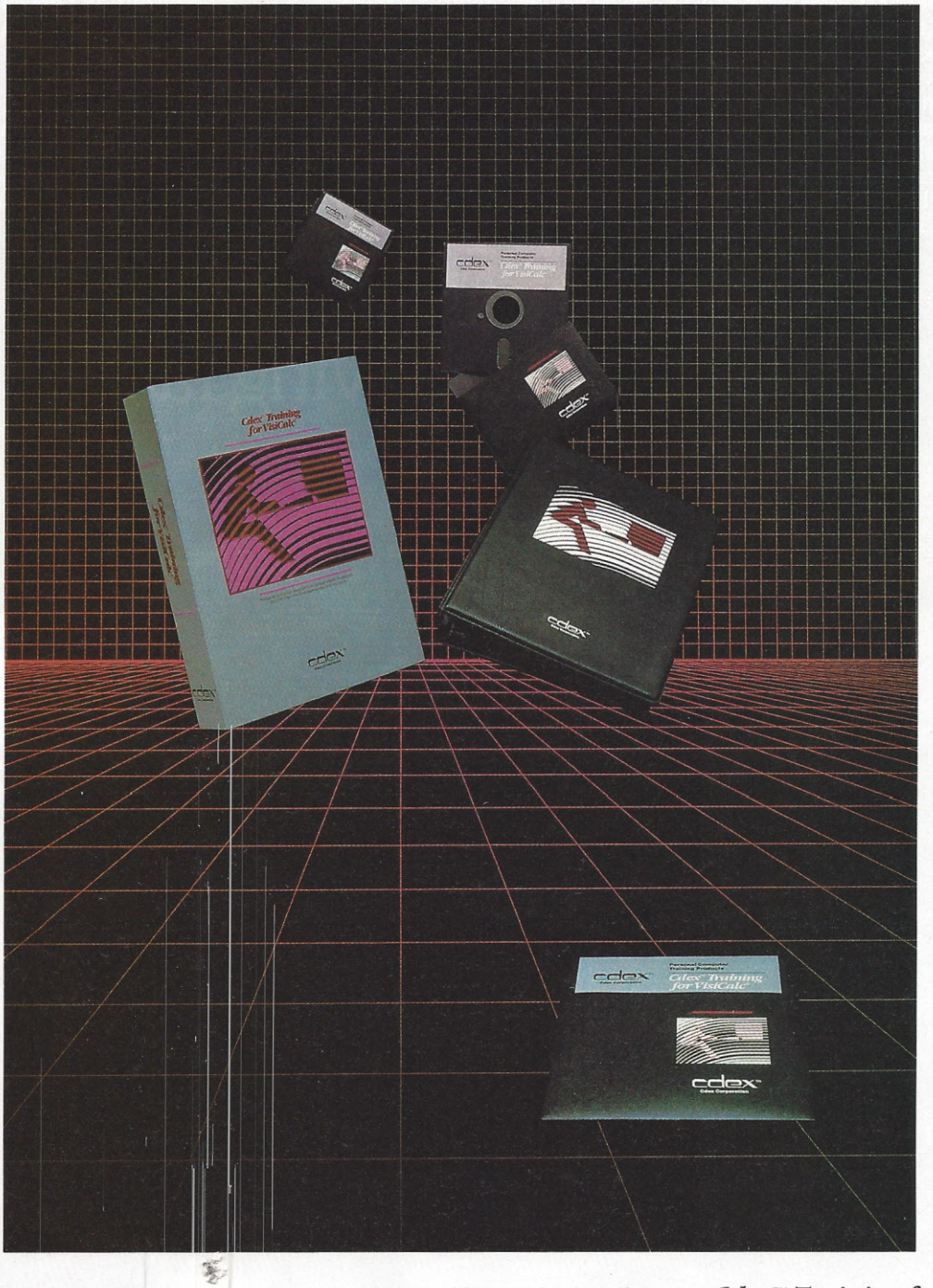
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CIRCLE 47

Cdex™ Training for VisiCalc® Makes VisiCalc Easy.



In an hour, Cdex Training for VisiCalc can make you a VisiCalc user. Or for the experienced VisiCalc user Cdex Training for VisiCalc acts as an instantaneous electronic reference and review system.

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CIRCLE 110

Four times faster than any 300 bps modem, to be precise. With Hayes Smartmodem 1200, any computer with an RS-232C connection — such as the IBM Personal Computer, TRS-80® or Apple® III — can communicate over telephone lines with other computer terminals or printers. Smartmodem 1200 connects directly to any standard telephone jack in the USA. Dialing can be Touch-Tone,® pulse or both. It can even operate over multiline phone systems (PBX) to dial numbers, receive and transmit data, and disconnect — automatically. An internal speaker lets you hear the call being made and monitor its progress. That way you'll know immediately if the line's busy or you reach a wrong number. And indicator lights keep you posted on the current operating status: modem ready, terminal ready, carrier detect, auto-answer and high speed.

Smartmodem 1200 is two modems in one. Like the original Hayes Smartmodem, it can communicate with other Bell 103 type modems at up to 300 bps. Plus it's a 1200 bps modem for communicating with the faster Bell 212A type modems. Unlike many 1200 bps modems, Smartmodem 1200 lets you select full or half duplex, for compatibility with time-sharing services or any other system you choose. Smartmodem 1200 allows you to access The Source,℠ communicate with your branch offices, or exchange programs with other computer users. In fact, it performs just about any communication function you can imagine, and can be program controlled using any language.

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CIRCLE 34

Improve Business Efficiency With New Software Offerings

Each month Personal Computing *scans the software market to keep you up to date on everything that's new. Those products we consider to be most useful and exciting in this month's crop are described in this section and commended for your closer examination. Others are listed in the index.*

NEW SOFTWARE FOR THE APPLE // e DOES THE WORK OF THREE PROGRAMS FOR THE PRICE OF ONE

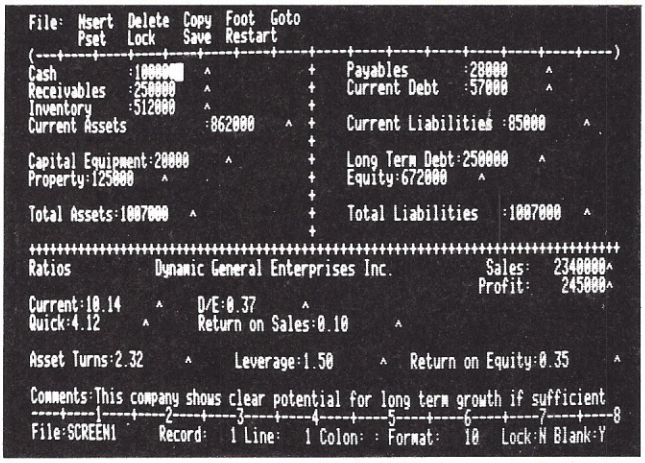
Are you on a budget? Do the functions of file management, word processing, and calculation pretty much cover what you want out of your computer? Do you find that specialized programs in these areas often cost too much, take too long to learn or to keep current, and do more than you really need? Does having to load one program after another into memory as you go through the day get you down? Well, there may be one program in all computerdom that will make you happy: The Incredible Jack, from Business Solutions, Inc., for an Apple //e or Apple II Plus with 64k RAM and two disk drives.

Our test of Jack showed you could just load it into your computer and leave it there all day. Say you start a business letter and, halfway through, a client calls with a question. Saving your letter on disk, you switch to the file management function, get the data you need, switch to the logic function, get the calculations you need—give your client one-call turnaround on his question—and return to your letter without ever leaving your program!

It all works on about 36 commands, plus the math and logic rules/symbols you already know (such as IF, THEN, AND, OR). At every step you have an on-screen menu appropriate to the mode you're in. One key gets you back to the previous menu. So after learning it you mainly choose menu commands to get around in Jack. The integrated command format lets you learn just one set of commands for such functions as printing and disk management. You format documents visually on the screen, saving the need for dozens of imbedded formatting commands. You need just a few commands for laying out your text display and editing.

Having so few commands explains why Jack takes so little time to learn; but the compact documentation manual and on-screen menus help too. A relative newcomer to computing became comfortable with Jack (working through the manual's tutorial) in an hour, with only occasional help. An experienced computer user took even less. In five hours you should be flying with Jack, regardless of your background, thanks to the 57 diskette-size pages of tutorial. The comprehensive 67-page reference section will help you thereafter. The reference section includes a troubleshooting guide, calculation templates, index, and more.

For $129 you get a remarkable program specializing in the generalist's needs. Jack lets you adapt the computer to your work flow, freely using the various functions as needed. True, you'll have to go to specialized programs if you want to transmit files over phone lines, do graphics, or use



The Incredible Jack's integrated command format lets you learn one set of commands to format documents visually on the screen.

a hard disk. But if Jack's functions fit your needs, no combination of single-function programs will fill those needs at anywhere near Jack's price.

FOR MORE INFORMATION: BUSINESS SOLUTIONS INC., 60 East Main St., Kings Park, NY 11754.

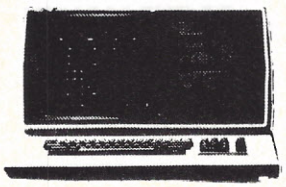
—Lee Thé, Technical Editor

VISICALC PROGRAM DOUBLES SIZE OF "WINDOW," ALLOWS FOR UP TO NINE TIMES USER MEMORY SPACE

Videx's V CALC 80 with memory expansion transforms VisiCalc on the Apple II into a wider-screen format. While the standard VisiCalc program allows you to create a very large electronic spreadsheet, your view of it is limited to four columns and 20 rows. V CALC 80 widens this view to eight columns, making it much easier

(continued on page 230)

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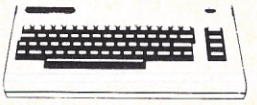
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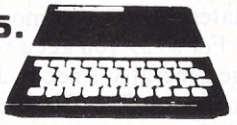
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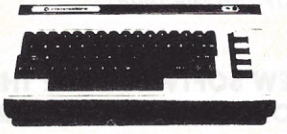
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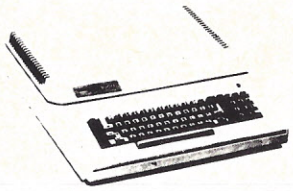
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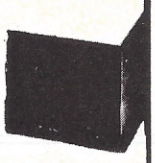
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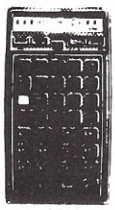
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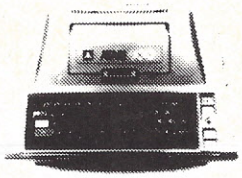
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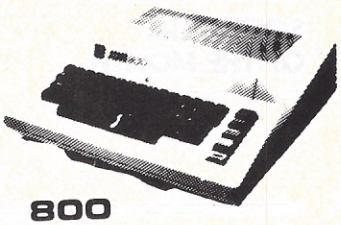
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CIRCLE 112

SOFTWARE OF THE MONTH

(continued from page 227)
to see what you're doing. It requires installing a Videx Videoterm 80-column video-display board with an inverse display chip ($29 if your terminal doesn't have one).

In addition to widening your view of the spreadsheet's surface, V CALC can widen your VisiCalc user workspace for working out calculations. You can install one or more random access memory cards from various manufacturers and increase the user area from the 19k of a 48k Apple to as much as 176k—nine times as large!

In 15 minutes you'll have V CALC configured—even if you're a novice. Then you load it into memory and boot VisiCalc. It adds 30 seconds to your boot procedure. When you're in VisiCalc, you can move the cursor long distances via the GOTO command rather than by scrolling the cursor.

V CALC 80 comes in two versions. For $89 you get the full package. If you just want the display enhancement without memory expansion, the price is $49. Either way, you'll find the addition of V CALC makes working with VisiCalc much more enjoyable.

FOR MORE INFORMATION: VIDEX, INC., 897 N.W. Grant Ave., Corvallis, OR 97330; (503) 758-0521.

—Lee Thé, Technical Editor

SALES MANAGEMENT DATA BASE TO HELP YOU MAKE MORE MONEY

The Prospector, from Executive Data Systems, is a sales-management data base for personal computers. The package helps organize and support any sales effort with an on-line data base that is limited only by disk space. The record for any client or prospect can be instantly accessed, and the record's data are displayed on the screen for examination or updating.

According to Laura Spann, president of the company, "The Prospector will help any business or professional person make more money from sales efforts. It can easily pay for itself many times over in its first month of use."

The Prospector can support personal sales calls, telemarketing, and direct-mail advertising; list and label selections by any code combination; write a WordStar-compatible file for personalized mail promotions; and efficiently schedule client/prospect follow-ups.

Typical uses for The Prospector include maintenance of client lists, prospect lists, subscription lists, and supplier lists—subsets of which can be extracted at will. It can be used to automate a typical desktop name and address file, or it can be used as the first step in an automated but personalized mail promotion. The program is suited for maintaining a tickler file of prospects to be contacted at specific future times, and for storing relevant information about these prospects. It can even be used by doctors, dentists, and other professionals to send appointment or checkup notices to patients at appropriate times.

According to the company, The Prospector, which is written in COBOL, is easy to learn and easy to use with no training required. However, the program does come with a detailed user's manual describing its operation and uses as a sales management tool.

The Prospector is currently available for all CP/M and MP/M computers, including the Apple II Plus and the TRS-80 Model II with CP/M. It is also available for most popular 16-bit computers, including the IBM Personal Computer and others using the MS-DOS operating system. Its suggested retail price is $300.

FOR MORE INFORMATION: EXECUTIVE DATA SYSTEMS, INC., 290 Interstate North, Atlanta, GA 30339; (404) 955-3374.

A DATA-BASE MANAGEMENT SYSTEM FOR EVERY NEED

To meet the need for a data-base management system that allows end users to create their own applications without programming, Micro Applications Group (MAG) announces MAG/base. Rather than using commands, the software uses a simple, fill-in-the-blank style to allow users to create their own files, reports, and special forms without a specialized computer language.

Derived from MAG's popular PRISM package, MAG/base differs from competitive data-base management systems primarily because it uses a simplified operational approach, the company says. It is offered in three levels that are all upwardly compatible. Users can upgrade from one to the next as their data-base management requirements grow.

MAG/base-1, the Personal Filing System, is designed for the user wishing to keep things simple while having full data-base capabilities. This software generates most list-oriented applications, including mailing lists, customer lists, real-estate listings, data entry, direct mailings, and telephone lists. Files can be indexed and cross-referenced by as many as 99 keys. Mail-merge capabilities are provided for producing personalized form letters, mailing labels, and other special forms.

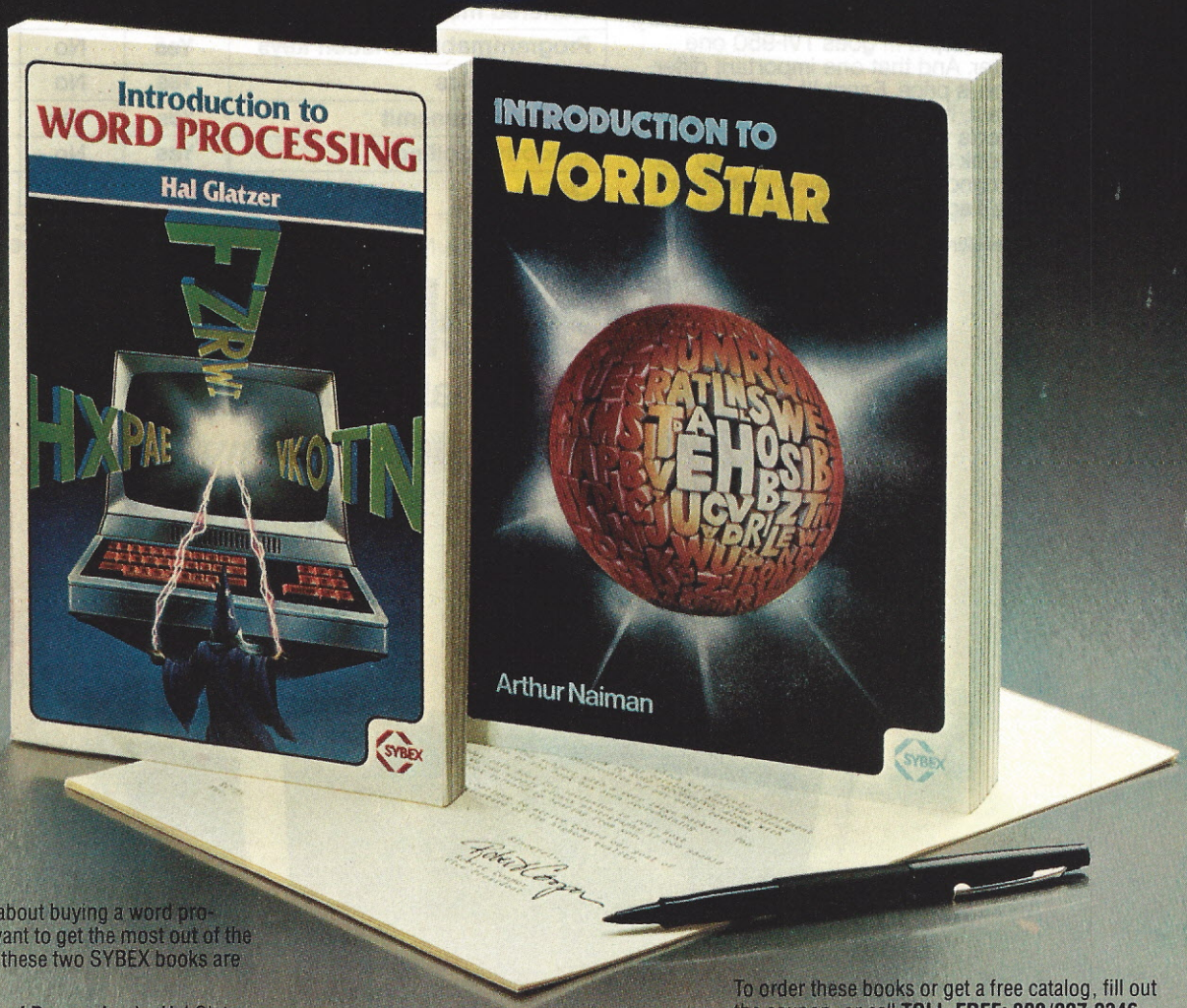
MAG/base-2 offers all the capabilities of MAG/base-1 plus the MAG/base Report Writer, which allows the user to have complete control over the appearance and content of reports, queries, and special forms. MAG/base-2 is appropriate for more complex applications, such as client billing, sales analysis, personnel-agency systems, price lists, and history reports.

An Advanced Report Writer Option adds relational multifile capabilities to the MAG/base Report Writer. Reports and queries can present information, perform calculations, select records, and take control breaks for subtotals from any of up to five files simultaneously.

MAG/base-3 is designed for the advanced user or programming professional. It provides all MAG/base-2 capabilities, including the Report Writer, plus a set of

(continued on page 235)

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CIRCLE 113

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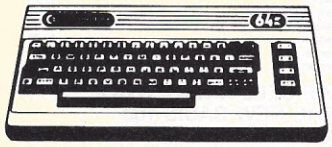
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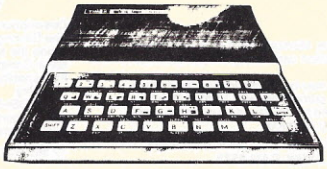
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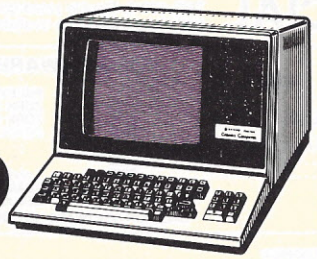
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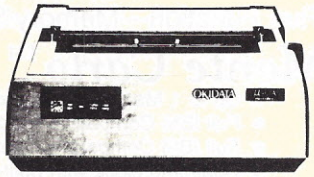
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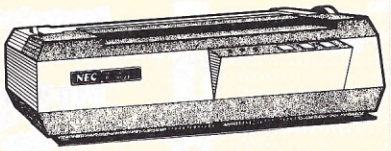
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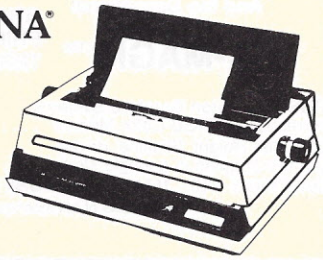
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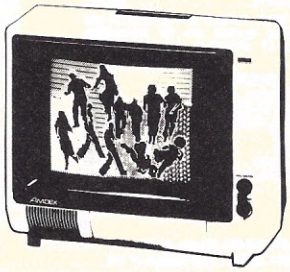
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(continued from page 230)

programming aids that significantly reduce the programming effort required to develop custom applications. Its features include menu definition, password protection, screen management, and entry and edit functions. Data Management Language allows user programs written in CB80 or CBASIC to interface to MAG/base data files directly through the data dictionary. MAG/sam, MAG's multikeyed file-access method, is also included in MAG/base-3.

MAG/base is compatible with CP/M, MP/M, CP/M-86, and MP/M-86 operating systems. Versions are in development for PC-DOS and MS-DOS. MAG/base-1 costs $295; MAG/base-2, $495; MAG/base-3, $795.

FOR MORE INFORMATION: MICRO APPLICATIONS GROUP, 20201 Sherman Way, Suite 205, Canoga Park, CA 91306; (213) 700-1426.

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According to William Lohse, IUS vice president of sales and marketing, EasyPlanner should not be confused with VisiCalc and similar spreadsheet programs. EasyPlanner is programmable; the user can specify the exact steps needed to perform financial-worksheet calculations.

"EasyPlanner is powerful in its ability to combine and consolidate worksheets," Lohse says. "Employing this feature, a divisional manager in an organization can work out his budget, then have an assistant consolidate it into the overall corporate budget without having to do that himself."

EasyPlanner retails for $250.

FOR MORE INFORMATION: INFORMATION UNLIMITED SOFTWARE, 2401 Marinship Way, Sausalito, CA 94965; (415) 331-6700.

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The package has a suggested retail price of $350.

FOR MORE INFORMATION: BUSINESS & PROFESSIONAL SOFTWARE, INC., 143 Binney Street, Cambridge, MA 02142; (617) 491-3377.

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The programs have five objectives: to teach shape, letter, and number recognition; present the concept of same and different; reinforce directional concepts; develop listening skills; improve eye-hand coordination.

PDI's Preschool Library is designed for use with Atari 400 and 800 computers. It consists of four cassettes.

FOR MORE INFORMATION: PROGRAM DESIGN, INC., 11 Idar Ct., Greenwich, CT 06830; (203) 661-8799.

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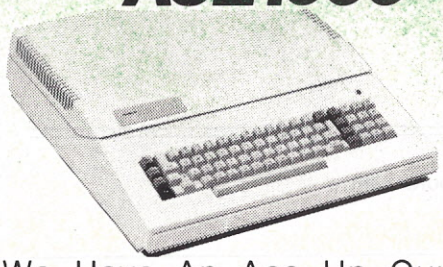
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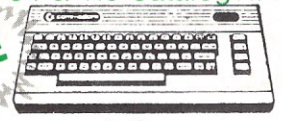
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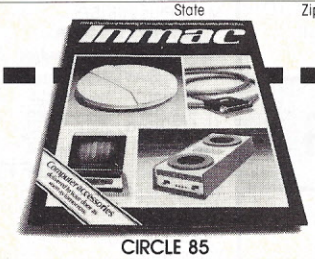
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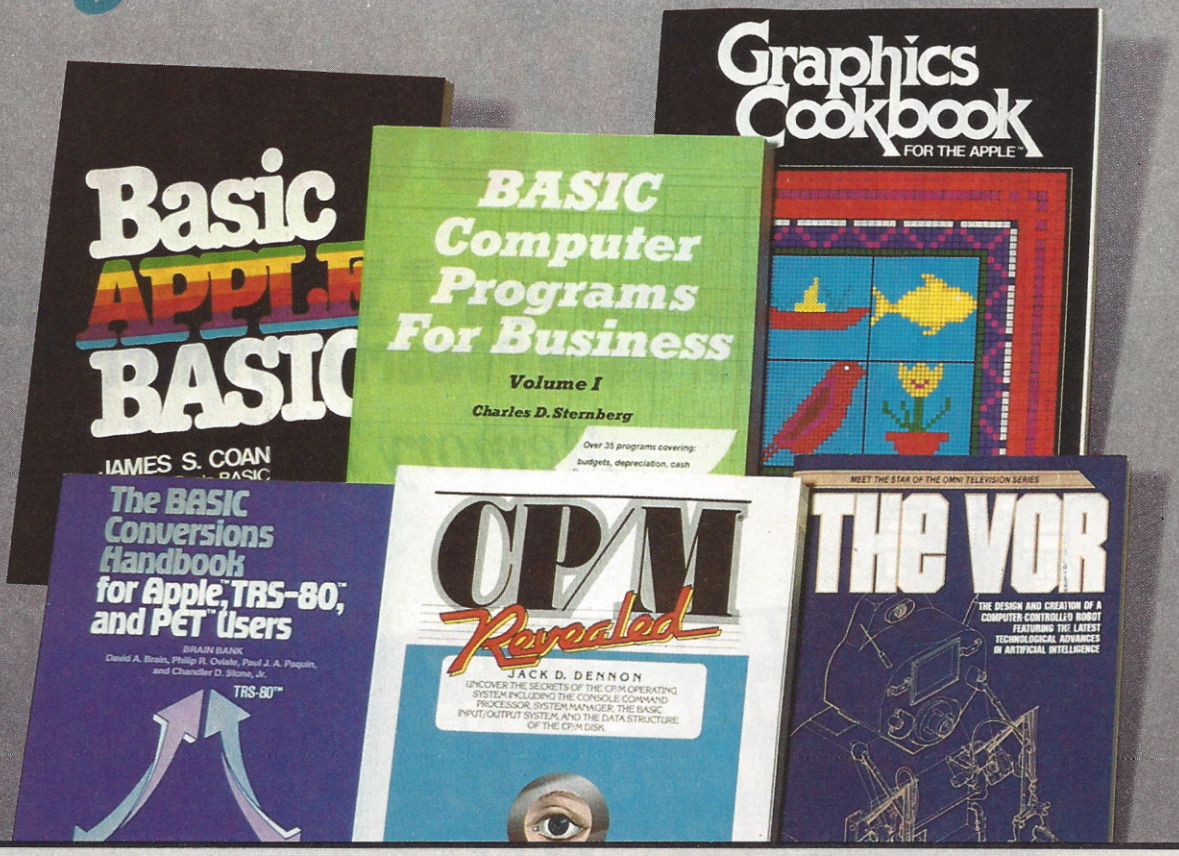
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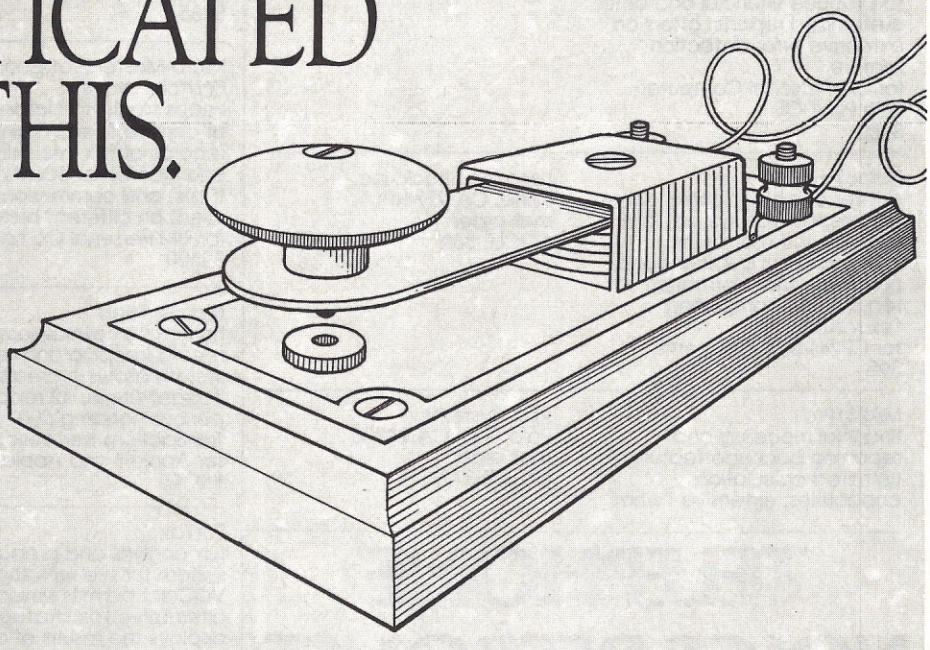
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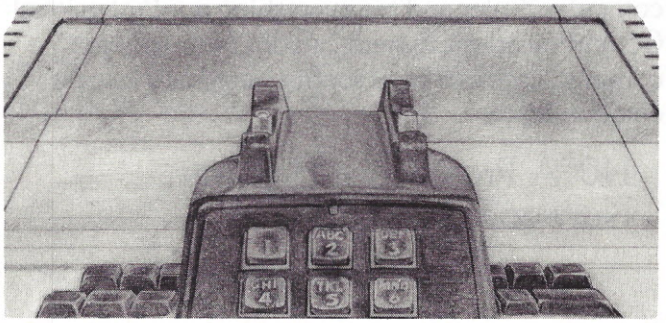
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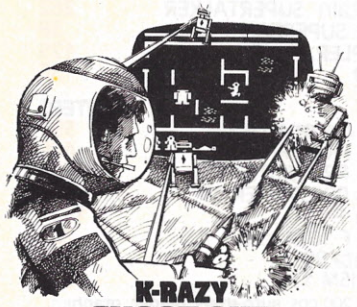
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The reason you bought a computer in the first place.

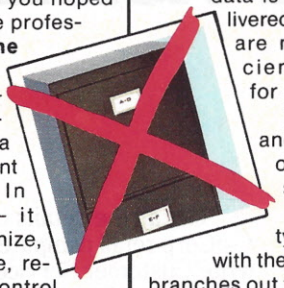


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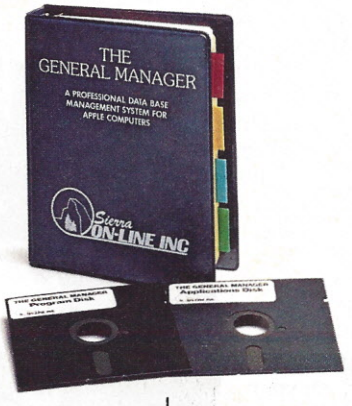
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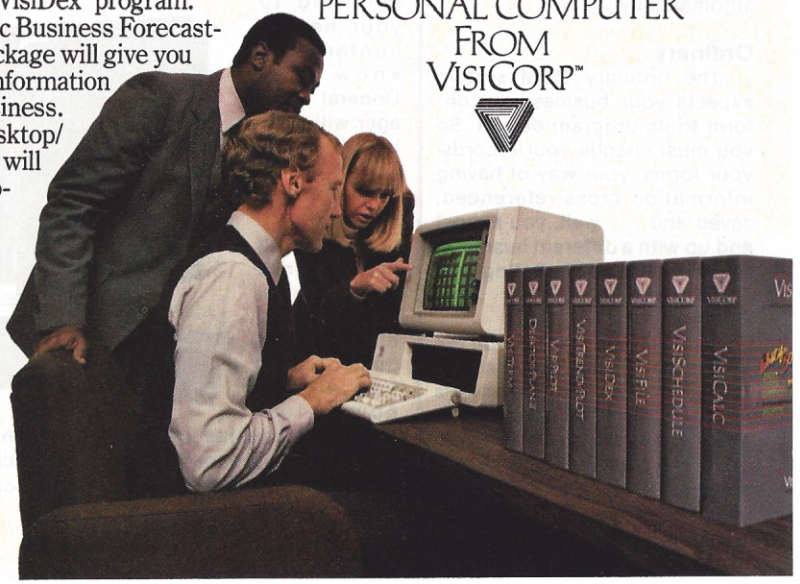
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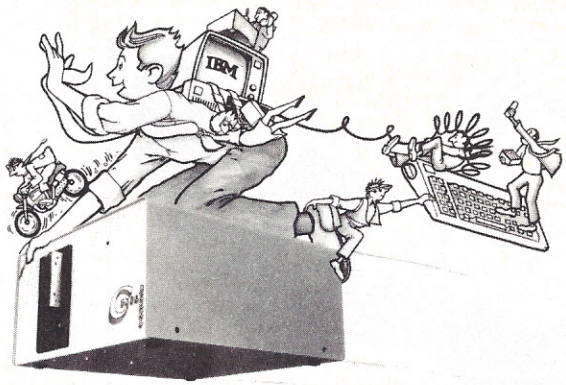
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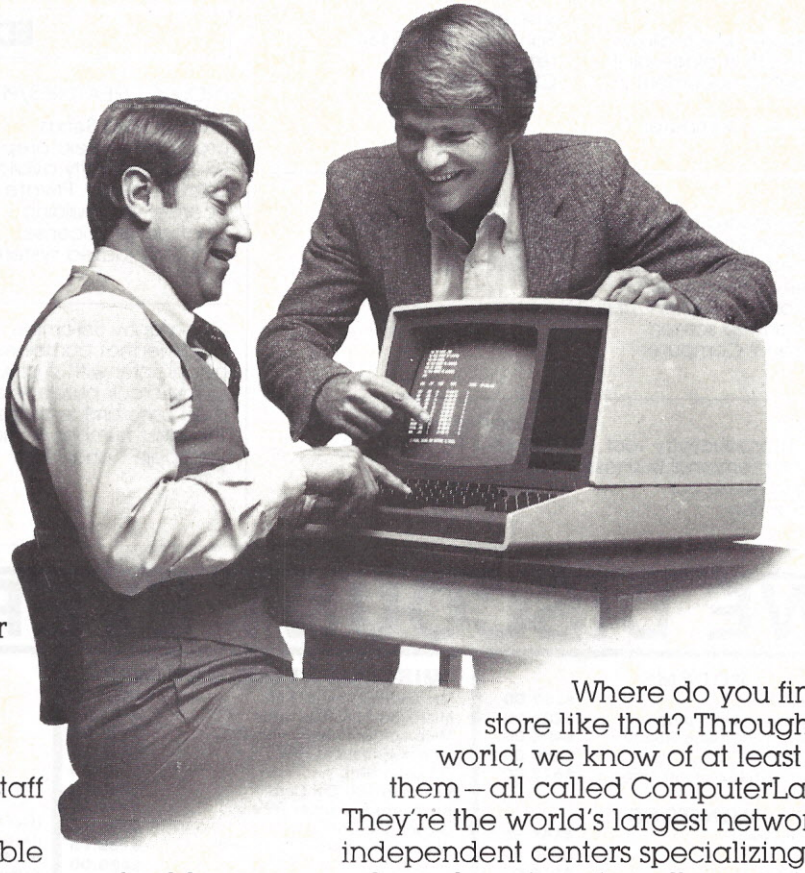
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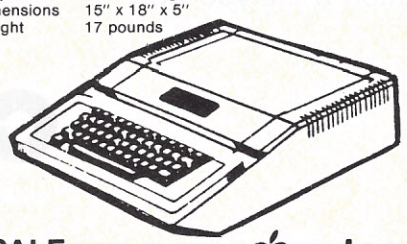
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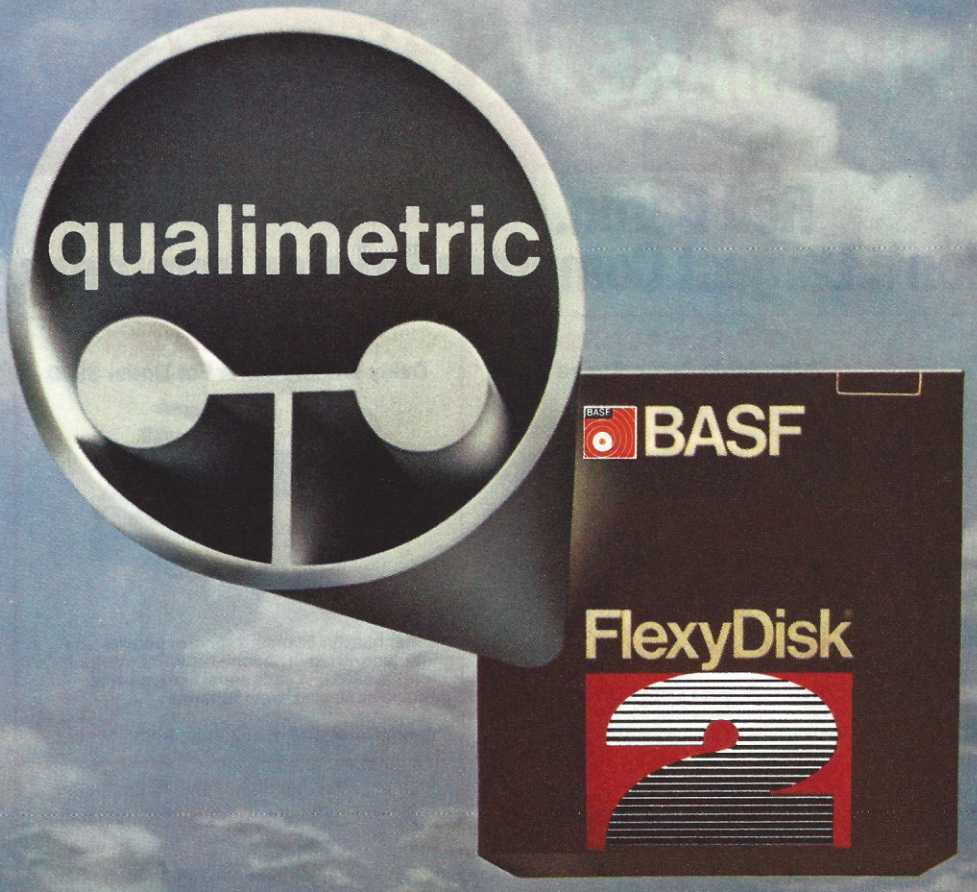
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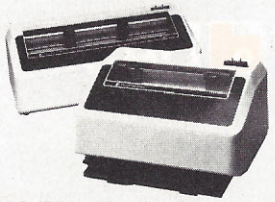
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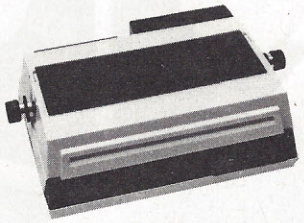


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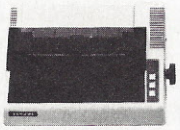
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HAYDEN SOFTWARE. THE MIND-STRETCHERS.

From this page on, your computer is going to be more valuable to you than ever before.

You'll get more fun out of it. More education. More of everything you bought your computer for.

All because you're going to see what Hayden Software can do for your computer, and you.

You can choose from dozens of Hayden games and educational programs, with new ones coming out all the time. But they all have one thing in common:

Hayden

they're designed to help you stretch your mind . . . and your computer.

Take Bellhop. On the surface, it's such a *simple* game. You merely pick up a rich guest's luggage in the hotel lobby, take an elevator to the penthouse and collect a fat tip.

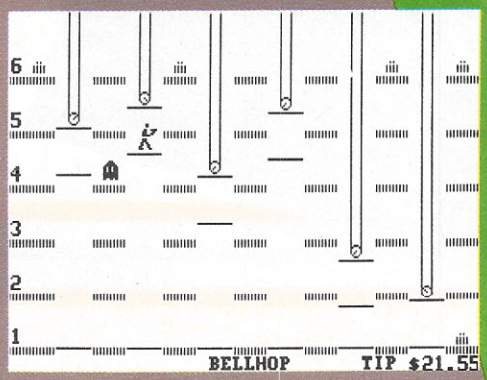
Not so fast. The elevator's never there when you need it. And there's this lug-gage-grabbing ghost loose in the hotel, ready to throw those bags back down to the lobby. If *you're* not fast, your tips go down . . . fast.

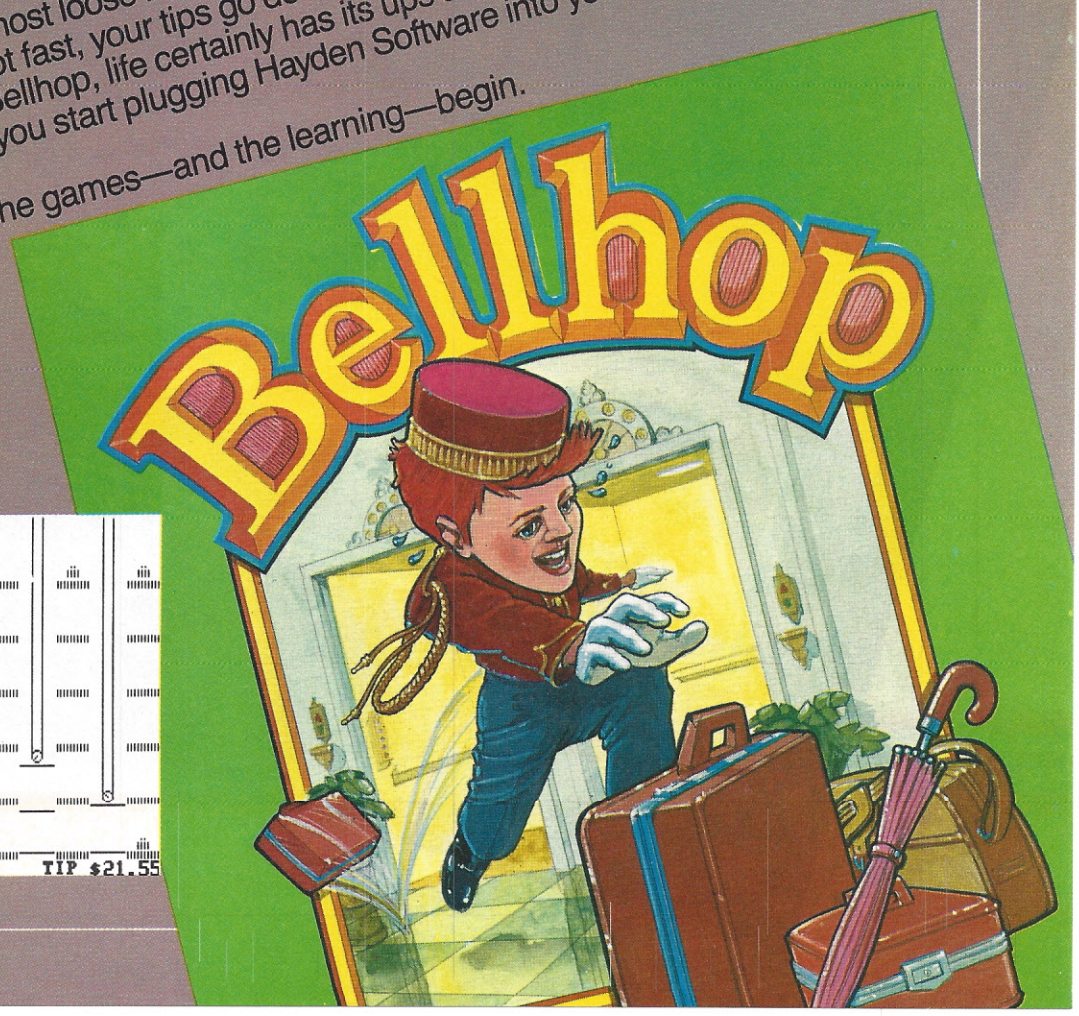
Yes, for a Bellhop, life certainly has its ups and downs.

But when you start plugging Hayden Software into your computer, it's all up for you.

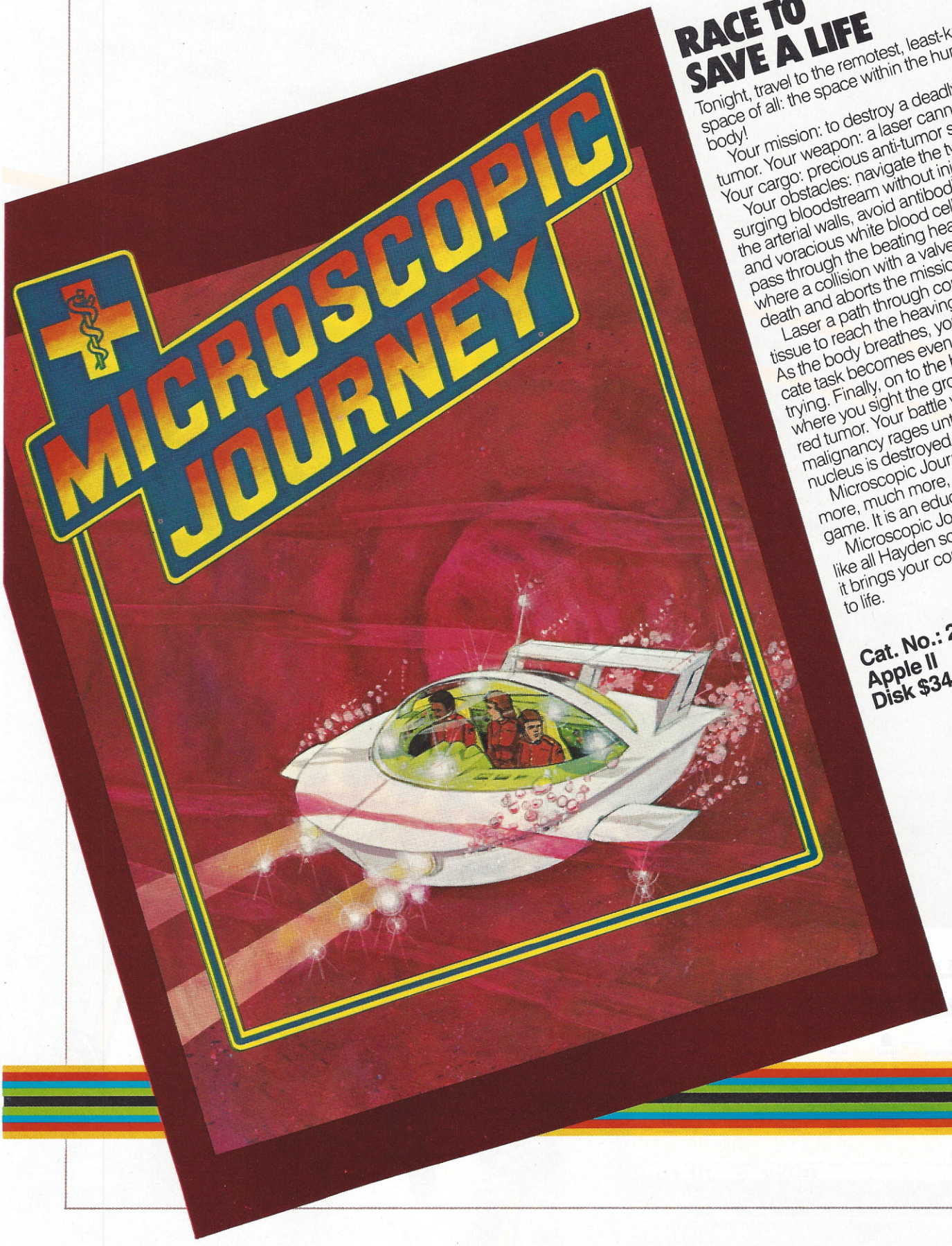
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Cat. No. 19109
Apple II Disk $34.95





WHEN THE NAME SAYS HAYDEN,



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Tonight, travel to the remotest, least-known space of all: the space within the human body!

Your mission: to destroy a deadly tumor. Your weapon: a laser cannon. Your cargo: precious anti-tumor serum. Your obstacles: navigate the twisting, surging bloodstream without injuring the arterial walls, avoid antibodies and voracious white blood cells, pass through the beating heart where a collision with a valve brings death and aborts the mission.

Laser a path through connective tissue to reach the heaving lungs. As the body breathes, your delicate task becomes even more trying. Finally, on to the brain, where you sight the growing red tumor. Your battle with the malignancy rages until its nucleus is destroyed.

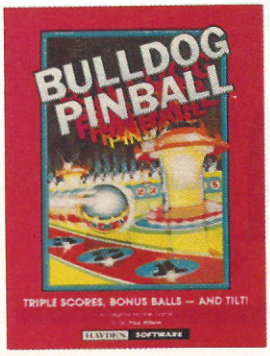
Microscopic Journey is more, much more, than a game. It is an education.

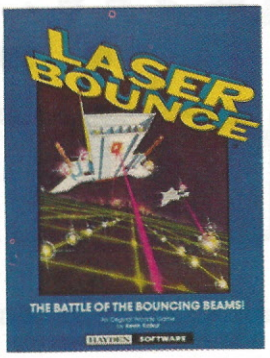
Microscopic Journey: like all Hayden software, it brings your computer to life.

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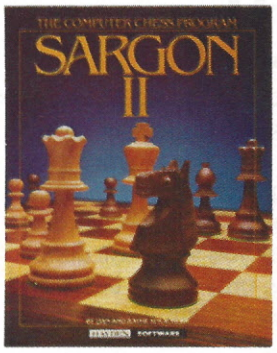
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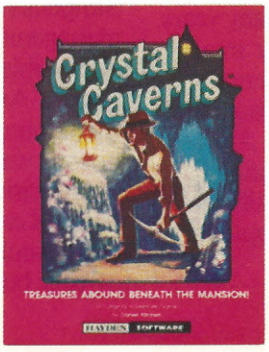
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Simplicity Accounting™

Easy. Fast. Accurate. And very very friendly.

Hayden's Simplicity Accounting software is a natural extension of your bookkeeping system. All the advantages of computer technology with the simplicity of a manual method. No hassles. Just great accounting software for your small business.

Hayden's easy-to-use programs are designed for the company just beginning to use computers for financial tasks. They operate like a manual or ledger card system but with the speed, accuracy and auditability of an automated system.

You perform one transaction at a time, while the software does all the calculations, updates records and prints totals in seconds. Instructions are displayed "menu-style" on the screen in a clear, uncomplicated fill-in-the-blank format that keeps the whole operation extremely simple.

This friendly new software was written by people who have worked with small businesses for many years. It offers all the features your small business needs in a no-nonsense, straightforward set of programs that is efficient and inexpensive. Also, Hayden's Simplicity Accounting bookkeeping systems are fully integrated and run under the popular CP/M* operating system.

Easy to Use

You'll be able to use Simplicity Accounting software as soon as you get it back to the office. It is easy to learn because it does bookkeeping the way you've always done bookkeeping: just call up a file and record your transactions; enter payments, debits, payroll information, inventory data. Then put it away and go onto the next. That's it. No batching problems. No hassles. In fact, Simplicity Accounting uses the same "enter-it-process-it" approach that small businesses have used to keep their books since long before the computer came around. No disruption in your office procedure. The way you've always done bookkeeping, only faster, better and much more accurately.

More than Bookkeeping

Simplicity Accounting gives you management information almost impossible to get from a manual system. And it is accurate, up-to-the-minute information, available now so you can make critical business decisions with all the facts. Control cash flow, analyze sales, avoid stock outs, monitor the pulse of your business.

The Simplicity Accounting System

General Ledger

The General Ledger module has two distinct parts: General Ledger posting with related reports, and Financial Statements. It can be used with the other programs in the family or as a free-standing system. And

*CP/M is a trademark of Digital Research, Inc.

it is very flexible so you can easily tailor it to your specific needs. In addition, the General Ledger module can be used as an excellent client writeup program for a small accounting or bookkeeping service.

- System allows department profit analysis and consolidation.
- System can work with a 12 or 13-period year.
- Comparisons can be made against last year's figures or against budget, in percentages or as dollar variances.
- Report formating is accomplished through separate format records.
- Custom reports to prepare various journals.

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Price: $449

Accounts Receivable

A fast, high-volume, easy to use debit/credit posting system to replace manual "peg-board" systems or bookkeeping machines. Combines simple operation with sophisticated capabilities. Automatic General Ledger integration is optional.

- Payments posted to either oldest or selected invoices.
- System accepts partial payments.
- Open-item inquiry and statement preparation.
- Automatic finance charges applied to all or selected accounts.
- Complete account analysis.

Order No: 205xx
Price: $449

Accounts Payable

An effective way to manage cash requirements. For businesses on a cash basis, accrual basis, or combination. Automatic General Ledger integration.

- Selectable report reflects either past unpaid invoices or future cash needs.
- Open/unpaid item worksheet serves as turnaround document.
- Valid account number verification of General Ledger distribution made either during vouchering or check writing.
- Automatic G/L posting of both purchase journal and cash disbursement journal.

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Price: $449

Payroll

Fast, easy to install and operate. Just enter pay period data for each employee. Checks are cut and records adjusted immediately. Automatic General Ledger integration optional.

- Multi-state payroll tax calculations.
- Automatic calculation of earnings, taxes and deductions.
- Up to six automatic deductions per pay period.
- Provision for operator override of all calculations.
- Easy handling of terminated "early payoff" employees.
- Permits more than one check per period for each employee for vacation, bonus, etc.
- Produces quarterly earnings and deductions reports.
- Can maintain Federal, FICA, state and local tax tables.

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Price: $449

Inventory

Stand-alone program gives management and purchasing personnel an up-to-the-minute analysis of inventory stock levels, product sales performance and profitability on an item-by-item basis. Provides tools to help keep inventory levels at a minimum while avoiding "stock outs."

- All records updated, journals printed as data is entered and verified.
- Products can be divided into categories, items sorted and reported by product group.
- Last or average cost methods may be used.
- Three sales prices stored.
- Items may be assigned either internal or supplier-generated codes.
- Can print physical inventory list worksheet.
- Actual inventory adjustments easily made.
- Inquiry on an item displays the whole record.

Order No: 208xx
Price: $449

It Grows with You

Start with any of the Simplicity Accounting modules and add others as your business expands. All are truly modular and integrate with General Ledger when you're ready. Begin with Receivables or Payables today and expand to Payroll or General Ledger tomorrow, or next month or next year. Simplicity Accounting is a bookkeeping system you can stay with for a long time.

The Hayden Advantage

Simplicity Accounting systems do not stand by themselves. They are all part of the growing family of Hayden Software, designed, built and supported by a company with the experience and resources to give you more than just great accounting software. All Hayden software is fully tested and warranteed. User manuals are complete and thorough, 3-ring bound in a handsome, durable slip case. Training materials and menu screens get you up and running fast, and keep you out of trouble.

Hayden provides a full range of software for your computer, including word processing, entertainment, educational and technical products. Visit your local dealer and learn about the Hayden advantage.

Discover Hayden's Simplicity Accounting. No hassles. Just great accounting software for your small business.

Available at your local dealer, or call toll free: 1-800-343-1218
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HAYDEN **SOFTWARE**

PIE: Writer

The best microcomputer word processor any money can buy.

Thousands of dollars worth of word processing performance for just $149.95

Who's saying that?

Arthur Naiman, for one, in the "Word Processing Buyer's Guide" to be published soon by McGraw-Hill.

In his definitive study, Naiman compared 14 major word processing products—and PIE: Writer was among the top three. Its nearest neighbors were dedicated word processors which cost from $13,500 to $15,000. (See a portion of the study results below.) Yet PIE: Writer can be part of your personal computer system for just $149.95!

So now your business or home microcomputer can have capabilities equivalent to the industry's top machines. Naiman says:

"PIE: Writer, running on a humble Apple II, outscored every other word processing program for microcomputers . . . (It) crams an incredible amount of power into a small (23½ K) and inexpensive package . . . PIE: Writer beat four out of six dedicated word processors."

	Operating system(s) and/or machine(s)	Price	Overall Score
CPT 8100	dedicated word processor*	$15,000	94¾
Dictaphone Dual Disp.	dedicated word processor*	$13,500	85¼
PIE: Writer:	**Apple II, IBM PC**	**$149.95 $199.95**	**84¼**
A.B. Dick Magna SL	dedicated word processor*	$14,500	83
Write	CP/M†	$400	82¼

*Includes word processing hardware & multistation support.

†Requires additional CP/M Hardware for your personal computer ($200-600 extra)

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No other microcomputer word processor earned the ranking that PIE: Writer did. PIE: Writer can make your personal computer into a word processing whiz.

That's not all.

PIE: Writer has been steadily collecting honors from experts throughout the industry for its all-around price/performance and its many advanced user features.

When Peelings II magazine compared 10 micro word processors, PIE: Writer came out on top . . . again. Peelings II rated PIE: Writer "AA+" and defined the rating as ". . . top notch, superb." The review concluded:

". . . a formidable contender in performance to price ratio . . . PIE: Writer is hard to beat."

And Interface Age said in an in-depth review of PIE: Writer's current version:

". . . much has been gained in this update to a time-tested classic."

Why the experts love PIE:Writer.

Why all the fuss?

Here are some of the features reviewers chose as the basis for PIE:Writer's excellent performance, and the reasons why you should choose PIE:Writer:

PIE:Writer is fast in executing functions such as search, scroll, page up and down.

PIE:Writer is easy to learn, with an excellent new set of user documentation.

PIE:Writer is copyable to back-up disks.

PIE:Writer can edit either text or programming code.

PIE:Writer is compatible with a wide range of hardware.

And reviewers note that PIE:Writer has refined the most sought-after editing features:

- wrap/columnar option
- text marking
- global word search & replace
- custom form letters and mailing lists
- justify right and left
- status display
- save or insert text from another file
- control page breaks
- cut and paste
- "Help" screen
- forward & backward page scrolling
- automatic centering
- full format control
- control page numbering, bottom and top headers
- underlining
- tabbing by word or moveable marks

You'll love PIE:Writer too.

You'll find everything you need in PIE:Writer. Whatever you write will be easier to do: reports, letters, books and articles, memos and personal notes. Use PIE:Writer with a 40 or 80 column set-up, lower case adapters, hard disks, modems or shift-key modifiers. PIE:Writer works with spelling checkers, Visi Calc* files and can edit program source files.

PIE:Writer gives you efficiency and capabilities far beyond other word processors. You can save valuable time and be more creative with all your documents. And PIE:Writer is an easy transition for typists as well as writers and managers.

You'll be using PIE:Writer the day you install it on your personal computer. Just a few moments with its built-in training lessons and you're up and running.

The experts use words like "powerful," "clean," "formidable" and "graceful" to describe PIE:Writer. But don't take their words for it. Try PIE:Writer yourself and enjoy the ease and excitement of the top-ranked word processor.

The Hayden Advantage.

There's another significant reason to love PIE:Writer: it's backed by Hayden Software, a company with the experience and resources to provide solid products; thorough, user-friendly documentation; and full technical support.

PIE:Writer is part of Hayden's growing "Personal Information Environment" family of software products. The PIE family also includes PIE:Speller, a 20,000 word dictionary spelling checker with a user-defined component. And PIE:Communications, which turns your personal computer into a communications center by letting you send and receive text between your computer and others.

Together with Hayden's other Professional Software products, the PIE family helps you make the most of your personal computer in any environment.

Hayden provides a full range of software for your computer, including business, entertainment, educational and technical products. Visit your local dealer and learn about the Hayden advantage.

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PIE:Writer. In micro word processors, the best any money can buy.

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If you want to learn to type faster, more accurately, come to Hayden.

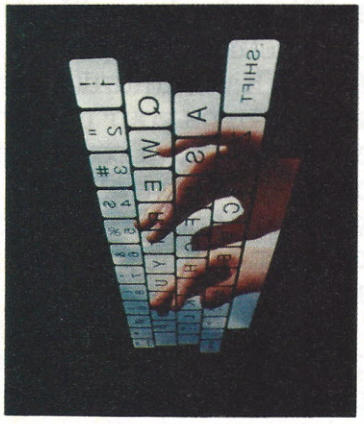
If you want to teach your preschooler basic math, come to Hayden.

If you want to program your Apple, come to Hayden.

Whenever you want more from your computer, come to the store that carries Hayden Software. You'll find thoroughly proven programs, with clear, understandable documentation.

All because Hayden believes that educational software is serious business.

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Ever wish you could type faster, more accurately? Your computer tc the rescue! You'll learn the touch method faster than you might suspect. And watch your computer entry improve!

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Full color, H I-RES graphics, animation, sounds and songs make this the perfect computer math game to introduce preschoolers to addition, subtraction, multiplication and division. For older children and adults too—as your skills progress, the game gets increasingly difficult.

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Payroll Plus handles records for as many as 300 employees. Logs sick and vacation time. Pays by wage, salary, commission or piece rate. Voids checks. Registers multiple pay periods. Compiles costs by project. But that's not all. *Payroll Plus* stores data for government forms, and compiles deposits for taxes, insurance and Social Security. It even computes local taxes.

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Operates with Accounting Plus II™ or as a stand-alone

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(continued from page 254)

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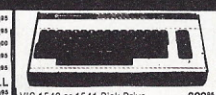
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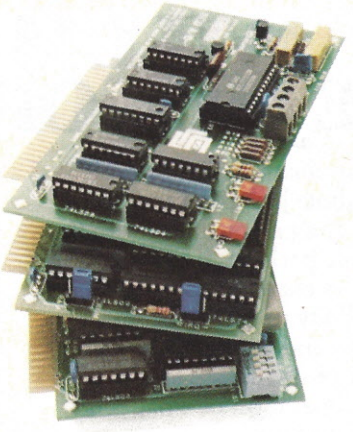
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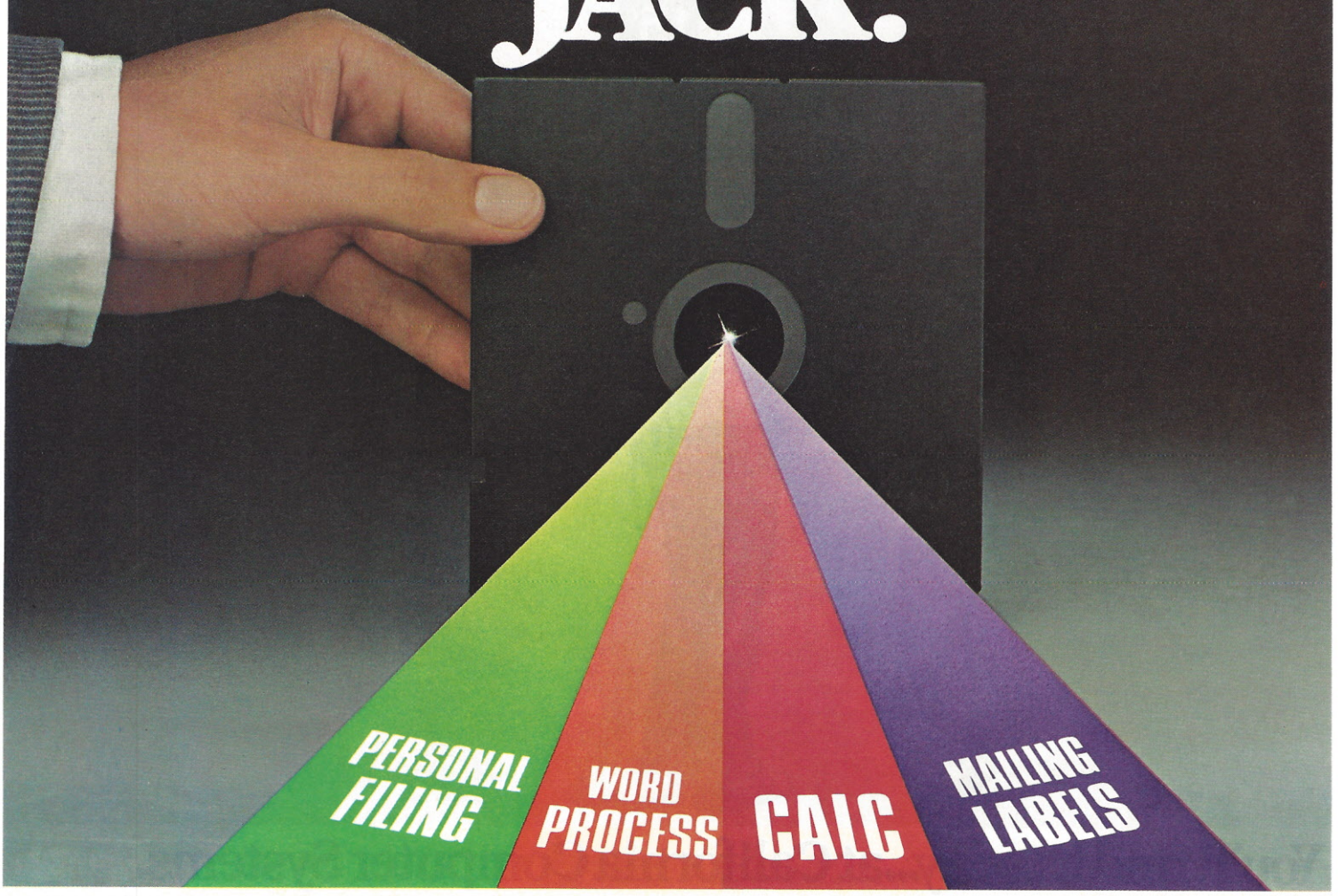
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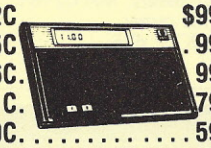
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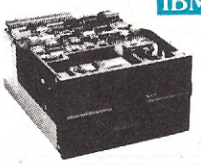
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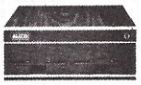


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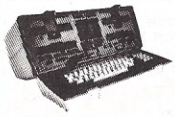
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HP-11C Slim-Line Adv Prog Sci	100.00	79.00
HP-12C Slim-Line Adv Finan Prog	150.00	129.00
HP-15C Slim-Line Advanced Programmable Scientific w/Matrices	135.00	119.00
HP-16C Slim-Line Prog for Digital Electronics and Comput Science	150.00	129.00
HP-41CV Handheld Comp with 5X Memory	275.00	209.00
HP-97 Desktop Fully Prog Print	750.00	599.00
Card Reader for 41CV/C	215.00	162.00
Printer for 41CV/C	385.00	289.00
Optical Wand For 41 CV/C	125.00	97.00
Quad Ram Equals 4 Mem. Mods	95.00	81.00

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EPSON	MSL	Our Price
Epson MX-80 T Type III*	645.00	CALL
Epson MX-80F/T Type III*	745.00	CALL
Epson MX-100 Type III* *w/graphics	995.00	CALL
OKIDATA		
Okidata 82A w/tractor 80 col	549.00	409.00
Okidata 83A W/tractor 132 col	899.00	709.00
Okidata 84P 132 col. serial	1395.00	1019.00
Okidata 84S 132 col. parallel	1495.00	1177.00
C. ITOH		
C. Itoh F 10 40 cps (parallel)	1795.00	1377.00
C. Itoh F 10 40 cps (serial)	1895.00	1439.00
C. Itoh Prowriter (parallel)	695.00	519.00
C. Itoh Prowriter (serial)	749.00	565.00
SMITH CORONA		
TP-1 Letter Quality	895.00	599.00
Tractors	150.00	139.00
STAR MICRONIC		
Gemini 10	495.00	379.00



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CALIFORNIA COMPUTER SYSTEMS	MSL	Our Price
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Disk Controller/CPM 2.2	425.00	339.00
64K Static RAM (200 ns)	750.00	549.00
Mainframe 110/60 HZ or 220V/50HZ	575.00	475.00
2 Serial Port+2 Parallel	360.00	289.00
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NOVATION	MSL	Our Price
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D-Cat	199.00	159.00
Auto-Cat	249.00	209.00
212 Auto Cat	695.00	629.00
Super Mike	14.95	12.95
Apple Cat II	389.00	289.00
212 Apple Cat	725.00	619.00
HAYS MICROCOMPUTER PRODUCTS		
Hays Stack Smartmodem	289.00	229.00
Smart Modem 1200	699.00	529.00
Micromodem 100	399.00	299.00
ANCHOR AUTOMATION		
Signalman Modem MK I	99.00	79.00
Mark VII (Auto Answer/Dial)	159.00	125.00

SOFTWARE

	MSL	Our Price
CHOPLIFTER by Broderband	34.95	26.20
Frogger by Sierra On-Line	34.95	26.20
Canyon Climber by Datasoft	29.95	22.50
Wizardry by Sir-Tech	49.95	37.50
Zork by Infocom	39.95	29.95
Snooper Troops #1 by Spinnaker	44.95	33.75
Deadline by Infocom	49.95	37.50
Apple Panie by Broderband	29.95	22.50
Master Type by Lightning	39.95	29.95
Typing Tator II by Microsoft	24.95	18.75
Story Machine by Spinnaker	34.95	29.95
The Home Accountant by Continental	74.95	56.50
PFS: File by Software Publishing	175.00	131.25
VisiCalc by VisiCorp	250.00	189.00
PFS: Report by Software Publishing	95.00	71.25
Screenwriter II by Sierra On-Line	129.95	97.50

MONITORS



BMC	List	Our Price
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12" Grn. Phs EO 1200 SU	219.00	149.00
NEC		
JB 12" Green	249.00	175.00
JC 12" Color	495.00	345.00
USI		
PI-2 12" Green	249.00	155.00
PI-3 12" Amber	289.00	185.00
AMDEK		
300 12" Green	195.00	145.00
Color I	395.00	325.00
Color II RGB Highres	895.00	695.00
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ECM 1302 1 13" RGB Hires	595.00	395.00
ECM-1302-2 13" RGB Hires	895.00	595.00
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CIRCLE 135

PERSONAL COMPUTING DEALERS

Many of the products and services listed in *Personal Computing* are available from the dealers listed here. This listing is in area-code order for easy reference. Retailers: If you would like to become a *Personal Computing* dealer, please call Merri Hollander, (201) 843-0550, ext. 313 for information.

ALASKA
Empire Electronic/Anchorage (206) 244-5200
Electronics Supply Center Inc./ Anchorage (907) 277-2142
Juneau Electrs/Juneau (907) 586-2260
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Anderson Computers/Huntsville (205) 539-3444
Computerland/Anniston (205) 237-5600
Madison Books (205) 772-9250
Olensky Brothers/Mobile (205) 344-7448
The Byte Shop/Huntsville (205) 534-4189
University Supply Store/Tuscaloosa (205) 348-6168
ARKANSAS
The Computer Company/Pine Bluff (501) 534-9599
Computerland of Fort Smith (501) 452-8860
Computerland of Fayetteville (501) 442-9441
Vaughn Electronics Corp/Rogers (501) 636-2343
ARIZONA
Computerland/Tucson (602) 297-7023
The Computer Store/Phoenix (602) 866-0258
Dataplace/Tempe (602) 839-0888
Dataplace/Phoenix (602) 266-6111
Desert News/Tucson (602) 747-0428
Food for Thought/Tucson (602) 327-9481
Heathkit Electric Center/Phoenix (602) 279-6247
Metro Computer Store/Tucson (602) 323-3116
Personal Computer Place/Mesa (602) 833-8949
The Xerox Store/Mesa (602) 898-9304
The Xerox Store/Phoenix (602) 861-3256
CALIFORNIA
Computerland of Fresno (209) 224-8200
Computerland/Stockton (209) 473-1241
Computerland/Visalia (209) 739-1033
Computers Etc./Stockton (209) 957-9500
Electric Brain/Fresno (209) 227-8479
Harding Way News/Stockton (209) 464-7514
Micro Pacific Computer Ctr./Fresno (209) 229-0101
Sunrise Computer Products/Merced (209) 383-9026
A-Vidd Electrs. Co./Long Beach (213) 598-0444
The Beverly Hills Computer Store (213) 276-6100
Compumart/Santa Monica (213) 829-3623
Computer Champ/West Covina (213) 960-9844
Computer Forum/Santa Fe Springs (213) 921-2111
Computer Seen/Long Beach (213) 438-7469
Computer Store/Santa Monica (213) 451-0713
Computerland/Burbank (213) To Come
Computerland/Lawndale (213) 371-4624
Computerland/Glendale (213) 246-2453
Computerland/Pasadena (213) 449-3205
Computerland/San Fernando (213) 716-7714
Computerland/Torrance (213) 543-2221
Computerland/West Covina (213) 960-6351
The Floppi Disk/Downey (213) 862-1888
Fyrst Byte/Whittier (213) 947-9411
HW Computers/Northridge (213) 886-9200
HW Computers (213) 370-5556
Levity Distributors/N. Hollywood (213) 982-2514
Love Computers/Arcadia (213) 447-0721
O Pamp Technical Books/Los Angeles (213) 464-4322
Personal Power/Canoga Park (213) 703-7921
Programs Unlimited/Studio City To Come
Rainbow Computing/Northridge (213) 349-0300
Sandy's Electrs/Canoga Park (213) 346-8353
Soft Byte/Tarzana (213) 345-9000
Software Centre International/Pasadena (213) 793-4443
Software Affair/Bellflower (213) 920-3219
Software Central/Pasadena (213) 793-4101
Software Etc./Woodland Hills (213) 702-8918
Software Store/Los Angeles (213) 473-1136
The Software Source/Encino (213) 705-4445
Unicomm, Inc./Tarzana (213) 451-8089
The Xerox Store/Encino (213) 907-1415
The Xerox Store/Pasadena (213) 793-0228
The Xerox Store/Santa Monica (213) 451-0866
The Xerox Store/Torrance (213) 316-5163
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Affordable Computer Sys./Santa Clara (408) 249-4221
Central Campbell Computers/Campbell (408) 370-0199
Computerland/San Jose (408) 267-2182
Computerland/Santa Clara (408) 246-4500
Computerland (408) 253-8080
Computerland (408) 988-1413
Computer Plus/Sunnyvale (408) 735-1199
Computer Works/Cupertino (408) 257-7863
Peninsula Computer Ctr./Salinas (408) 424-2103
Quement Electrs./San Jose (408) 998-5900
The Software Connection/San Jose (408) 270-0450
The Software Depot/Sunnyvale (408) 730-9494
Software Centre Int'l/Sunnyvale (408) 727-1555
Software Centre International/Oakland To Come
The Xerox Store/San Jose (408) 248-9000
The Xerox Store/Sunnyvale (408) 732-4222
Zackit Monterey (408) 375-3144
Byte Shop No. 1/Mountain View (415) 969-5464
Computer Age Co./San Mateo (415) 348-2666
Computer Center (415) 845-6366
Computer Post/Newark (415) 790-0410
Computerland (415) 794-9311
Computerland/El Cerrito (415) 527-8844
Computerland/Los Altos (415) 941-8154
Computerland San Francisco/Van Ness (415) 563-4414
Computerland/Walnut Creek (415) 935-6502
Computerland of the Castro (415) 864-8080
Friendly Software/San Carlos (415) 593-8275
Infosoft Systems/Concord (415) 680-0324
Keplers' Books/Los Altos (415) 948-5666
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Micro Age Computer Store (415) 964-7063
Micro Age Computer Store/Mt. View (415) To Come
Micro Age Computer Store/Pleasant Hill (415) 786-5264
Micro Tutor/Danville (415) 828-7884
Mission Computer Center/Palo Alto (415) 326-9689
P C Computers/El Cerrito (415) 527-6657
Printers (415) 327-6500
Robotek/El Cerrito (415) 524-3730
Skyles Electric Works/Mountain View (415) 965-1735
Software Emporium/Los Altos (415) 941-8788
Sorbus Station/San Leandro (415) 483-9862
The Software Shop/Burlingame (415) 340-7115
Stacey's Bookstore/San Francisco (415) 326-0681
Sunset Computers/San Francisco (415) 665-7378
Technika Berkeley (415) 524-8934
Softwaire Centre/La Mesa (619) 462-3900
Computer Scene (707) 462-1578
Santa Rosa Computer Ctr. (707) 528-6480
Zackit Vallejo (707) 644-6676
Advanced Computer Prods./Santa Ana (714) 558-8813
Byte Shop/San Diego (714) 565-8008
Capistrano Computers (714) 661-7250
Computer Age/San Diego (714) 565-4042
Computer Merchant/San Diego (714) 583-3963
Computer Metrics/El Cajon (714) 579-8066
Computerland (714) 464-5656
Computerland (714) 560-9912
Computerland/Laguna Hills (714) 859-8912
Computerland/North (714) 434-3300
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Computerland/W. Los Angeles (714) 560-9912
Computer Wave Inc./Westminster (714) 891-2584
Consumer Computers (714) 465-8888
CTC—The Computer People (714) 565-0505
HBJ Bookstore/San Diego (714) 238-1255
Heathkit Electro Center (714) 776-9420
Idea Computers T o Come
Integrated Circuits Unltd./San Diego (714) 278-4393
James Games Computer Center (714) 985-3278
Net Profit Computers/Anaheim (714) 750-7318
Powers Computer Center/Anaheim (714) 778-6021
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The Xerox Store/Brea (714) 671-0794
The Xerox Store/Costa Mesa (714) 646-8941
The Xerox Store/Costa Mesa (714) 641-9099
The Xerox Store/Huntington Beach (714) 898-8066
The Xerox Store/Long Beach To Come
The Xerox Store/Concord To Come
VIP Computer Centers/Irvine (714) 551-5622
Byte Shop/Ventura (805) 647-8945
Compusup/Lancaster (805) 942-5747
Computer Horizons/Camanillo (805) 987-4330
Computer Plaza/Santa Barbara (805) 687-9391
Computer Shop (805) 963-1325
Computer Solutions/Santa Monica (805) 922-6639
Computer Sound/Lancaster (805) 945-5921
Computerland Santa Clarita/Newhall (805) 254-3121
Computerland of Santa Barbara (805) 967-0413
Computerland/Thousand Oaks (805) 495-3554
Computerland Ventura (805) 396-8084
Dow Radio/Oxnard (805) 486-6353
QPSB Personal Electr./Goleta (805) 967-7100
Ventura County Computer Center (805) 648-5059
Byte Shop/Sacramento (916) 961-2983
Capitol Computer/Sacramento (916) 483-4729
Computer Place/Redding (916) 221-1312
Computerland/Redding (916) 241-7922
Computerland/Sacramento (916) 920-8981
House of Computers/Sacramento (916) 971-9642
Softwaire Centre Int'l/Sacramento (916) 925-3337
Student Bookstore/Cal State U. (916) 895-6044
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1 Stop Software Stores/Arvada (303) 431-6598
Aparat/Denver (303) 741-1778
Computer Connection/Englewood (303) 449-8282
Computer Connection/Boulder (303) 449-8282
Computer Shack/Pueblo (303) 564-3545
Computers, Inc./Englewood (303) 779-5256
The Xerox Store/Aurora (303) 695-8660
The Xerox Store/Denver (303) 825-2386
The Xerox Store/Denver (303) 692-0414
Whole Life Distributor/Denver (303) 861-2825
CONNECTICUT
Aetna Life Club Store/Hartford (203) 273-3058
Alban, Inc./Georgetown To Come
Anchor Microsystems/Westport (203) 222-1259
Bright Ideas/Gilford (203) 453-6665
Business Machine Center/Middletown (203-632-1939
Computer Ease/Milford (203) 877-7447
Computer Services/Danbury (203) 743-1299
Computer Store (203) 563-9000
Computer Store (203) 627-0188
Computerland (203) 235-9204
Computerland/New Haven (203) 273-4807
"80" Plus Microcomputers/Seymour (203) 888-0170
Exel Sys./Stamford (203) 348-5894
Harold's Drugs/Bristol (203) 583-1854
Hatry Electrs/New Haven (203) 787-5921
Logical Systems Inc./Farmington (203) 677-4557
Micro Age Computer Store/Greenwich (203) 629-8171
Micro Computer Store/Norwalk (203) 847-8428
Southern New England Electronics/ E. Windsor To Come
Technology Sys./Bethel (203) 748-6856
The Computer Establishment/ Old Saybrook (203) 767-8520
The Xerox Store/Hartford (203) 233-9871
Yale Co-op/New Haven (203) 772-2200
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Computerland/New Castle/Newark (302) 738-9656
Computer Store/Wilmington (302) 478-7772
Micro Products/Wilmington (302) 762-0227
The Smoke Shop/Wilmington (302) 655-2861
DISTRICT OF COLUMBIA
Computer Store (202) 272-0294
Pentagon Book Stores (202) 695-0870
Program Store (202) 337-4693
Students Book Co. (202) 223-3327
FLORIDA
Evans Business Computer Sys (209) 576-0451
Advantage With Computers/W. Palm Beach (305) 471-1753
A I Personal Computer/Longwood (305) 339-8914
Allstate Business Center Ltd./Miami (305) 665-1013
Byte Shop of Miami (305) 264-2983
Clarks Out of Town News/Ft. Lauderdale (305) 467-1543
Computer Ctr./Palm Beaches (305) 689-3233
Computer Generation/Plantation (305) 791-4578
Computer Scene/Miami (305) 945-1014
Computer Scene/N. Miami Beach (305) 238-7238
Computerland/Altamonte Springs (305) 862-6202
Computerland/Boca Raton (305) 368-1122
Computerland/W. Palm Beach (305) 684-3338
Electronic Equipment Co./Miami (305) 871-3500
Get Computerized Inc./Titusville (305) 268-4007
H.I.S. Computermation/Melbourne (305) 254-9399
Lighthouse Book Store/Lighthouse Pt. (305) 781-1945
Micro Age Computer Store/W. Palm Beach (305) 683-5779
Programs Unlimited/W. Palm Beach (305) 689-1200
Software Centrum/Coral Gables (305) 441-2983
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The Xerox Store/Altamonte Springs (305) 831-3100
The Xerox Store/Ft. Lauderdale (305) 524-4663
The Xerox Store/Miami (305) 667-5441
The Xerox Store/N. Miami Beach (305) 947-9346
The Xerox Store/Orlando (305) 898-5000
Computerland of Lakeland (813) 644-6437
Extra Extra Newstand/Tampa (813) 886-1802
Micro Computer System Inc. (813) 879-4301
New World Computer/Bradenton (813) 748-5485
The Xerox Store/Clearwater (813) 796-7507
The Xerox Store/Tampa (813) 977-8301
The Xerox Store/Tampa (813) 876-7439
Computer Sys. Resource (904) 376-4276
Computerland/Jacksonville (904) 731-2471
Computerland/Tallahassee (904) 224-9341
Florida Book Store/Gainesville (904) 376-6066
Goerings Book Ctr./Gainesville (904) 378-0363
Grice Electrs. Inc./Pensacola (904) 477-8100
Vitech/Tallahassee (904) 893-1743
GEORGIA
Al's Computer Store/Fayetteville (404) 461-3881
Atlanta Computer Mart/Atlanta (404) 455-0647
Atlanta Micro (404) 233-6942
Baileys Computer Shop (404) 790-5771
Computers Plus Inc./Atlanta (404) 237-7787
Computerland/Atlanta/Smyrna (404) 953-0406
Guild News Agency/Atlanta (404) 252-4166
Micro-Graphics Systems, Inc./Augusta (404) 790-5771
Peachtree Computer Center/Atlanta (404) 522-0082
Programs Unlimited/Atlanta To come
Sorbus Station/Doraville (404) 458-0620
The Xerox Store/Atlanta (404) 938-1276
The Xerox Store/Atlanta (404) 233-9025
The Xerox Store/Smyrna (404) 952-3901
Electronics 21 Inc./Savannah (912) 352-0585
Grey Communications Cons./Albany (912) 883-2121
Ocean Software/Jesup (912) 427-4278
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Amtec Inc./Honolulu (808) 955-7429
Computer Center/Pearl City (808) 448-2171
Computerland/Hawaii/Honolulu (808) 521-8002
The Computer Store/Hilo (808) 969-1166
IDAHO
Electronic Specialties/Boise (208) 376-5040
Magnum Computer/Boise (208) 342-7304
Northwest Computer Ctr./Boise (208) 375-6681
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Computerland/Champaign (217) 359-0895

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Computer Plus/Dyer (219) 865-3930
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TZ Computers/Bloomington (309) 829-6806
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Book Market/Chicago (312) 440-4475
Chigaco Downtown Computerland (312) 782-7180
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Nabih's Inc./Evanston (312) 869-6140
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Oak Brook Computer Ctr. (312) 941-9005
Page One/Roselle (312) 529-9060
Prairie News Agency/Chicago (312) 384-5350
The Software Store/Glenview (312) 724-7730
Sorbus Station/Bensonville (312) 459-8560
Wine Micro Computers (312) 420-8813
Univ. Bookstore/Carbondale (618) 536-3321
Appletree Computer/DeKalb (815) 758-8666
Computerland/Joliet (815) 741-3303
Computerland/Mundelein (815) 459-3892
Computer Store/Rockford (815) 962-7580
Ideal Computer Systems/Kankakee (815) 935-8505

INDIANA

Computer Plus (219) 865-3930
Computerland/Ft. Wayne (219) 483-8107
Computerland/Mirabel (219) 769-8020
Computerland/Mishawaka (219) 256-5688
Data Base/Ft. Wayne (219) 484-3164
A Computer Store/Indianapolis (317) 898-0331
Computer 1/Indianapolis (317) 257-3336
Computercraft/Carmel (317) 846-5996
Computerland/Anderson (317) 649-1122
Computerland/Indianapolis (317) 849-8811
Computerland/W. Lafayette (317) 463-3546
Graham Electrs./Indianapolis (317) 634-8202
The Software Exchange/Indianapolis (317) 251-7786
Von's Bookshop/W. Lafayette (317) 743-1915
Book Corner/Bloomington (812) 339-1522
Custom Software/Terre Haute (812) 234-3242
Data Domain/Bloomington (812) 334-3607
Hoosier Electrs./Terre Haute (812) 232-8508
KOE Computers./Div. Knapp/ Terre Haute (812) 232-4361

IOWA

Computer Country, Inc./Marion (319) 377-9437
Memory Bank/Bettendorf (319) 386-3330
Computerland/Des Moines (515) 270-8400
Omni Computer Center/Des Moines (515) 276-8858

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Computer Associates, Inc./Coffeyville (316) 251-1800
Computerland/Hutchinson (316) 662-6832
Computerland/Wichita (316) 684-3870
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Book Shop/Manhatten (913) 537-8025
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Computerland (913) 492-8882
Computerland/Lawrence (913) 841-8611
Computerland/Topeka (913) 267-6530
Kansas Micro Computer/Lawrence (913) 841-6348
Online Computer Centers/Overland Pk. (913) 341-6651
Personal Computer Ctr./Overland Pk. (913) 649-5942
The Computer Room/Beatty (913) 341-3500

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Computerland of Bowling Green (502) 781-9990
Heathkit Electr./Louisville (502) 245-7811
Stereo Stable's Computer Stall/ Owensboro (502) 685-6016
Computer World/Ashland (606) 329-0545
MicroAge Computer Store/Lexington (606) 278-0304

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Computers For All Inc./New Iberia (318) 365-9507
Computer Shoppe Inc./Metairie (504) 454-6600
Computer Terminal/New Orleans (504) 891-0007

MAINE

Coastal Computer Center/Brunswick (207) 729-0298
Retail Computer Ctr./Elsworth (207) 669-6736

MARYLAND

Balance Corp. Center Inc./Baltimore (301) 625-1100
Chafitz/Rockville (301) 340-3300
Computer Strategies Inc./Gaithersburg (301) 840-2173
Computer Unlimited/Towson (301) 321-1553
Computers Etc./Annapolis (301) 268-5801
Computerland (301) 340-8484
Computerland/Towson (301) 337-5555
Fredericks Computer Products/Frederick (301) 684-8884
Heathkit Electrs. (301) 881-5420
Komar Ltd./Baltimore (301) 675-2200
Logical Choice/Ellicott City (301) 465-3175
Program Store/Baltimore (301) 944-0200
Tri-State Computers/Salisbury (301) 742-2020
The Book Centers/Cumberland (301) 722-8344
The Comm. Center/Laurel (301) 782-0600
The Xerox Store/Rockville (301) 424-1450

MASSACHUSETTS

Computer Source/Pittsfield (413) 443-7181
Retail Computer Ctr./Ludlow (413) 589-0106
Computer Store/Sudbury (617) 232-5470
Computer Store/Cambridge (617) 354-4599
Computerland/Boston/Wellesley (617) 235-6652
Computerland/Boston (617) 482-6033
Computerland of Boston/Reading (617) 942-0707
Eden Microcomputers/Osterville (617) 428-3515
The Game Shop/Acton (617) 263-0418
Harvest Computer/Cambridge (617) 547-3289
Heathkit Electrs./Wellesley (617) 237-1510
Microcon Software Ctr./Watertown (617) 924-3333
The Micro Store/Taunton (617) 823-8106
New England Electronics CO/Needham (617) 449-1765
Ni-Ni's Corner, Inc./Cambridge (617) 547-3558
Out of Town News/Cambridge (617) 354-7777
Palace Spa/Brighton (617) 783-5858
Retail Computer Ctr/Ludlow (617) 935-8060
Small Business Group/Westford (617) 692-3800
Video Station/Woburn (617) 933-1445
YDI Electrs./Needham (617) 449-1005
The Xerox Store/Boston (617) 451-5800
The Xerox Store/Burlington (617) 273-5665
The Xerox Store/Chestnut Hill (617) 566-1707

MICHIGAN

Allen Park Computer Center/Allen Park (313) 383-8254
Binary Corp/Berkley (313) 548-0533
Computer Connection/Farmington Hills (313) 447-4470
Computer Contact, Inc./Grand Blanc (313) 694-3704
Computer Horizons/Livonia (313) 464-6502
Computer Mart/Troy (313) 649-0910
Computer Mart/Flint (313) 234-0161
Computerland/Ann Arbor (313) 973-7075
Computerland/Southfield (313) 356-8111
Computerland/St. Clair Shores (313) 772-6540
Condor Business System Center/ Ann Arbor (313) 769-3988
The Family Computer Center/Berkley (313) 546-8114
Front Page Bookstore/Pontiac (313) 332-3431
Heathkit Electr./Detroit (313) 772-0416
I Browse Books/W. Bloomfield (313) 855-9353
Infosource/Southfield (313) 353-0660
Heathkit Electr. Ctr./Detroit (313) 535-6480
Maple Office Supplies/Southfield (313) 559-8811
Micro Station Inc./Southfield (313) 358-5820
New Horizons Book Shop/Roseville (313) 296-1560
Rainbow Computers/Troy (313) 528-3535
Rochester Book Center (313) 651-0199
Simtec/Birmingham (313) 855-3990
Spectrum Computers/Lathrup Village (313) 559-5252
Very Small Business Computers/Warren (313) 573-7260
Community Newscenter (517) 349-3510
Computer Mart/Lansing (517) 351-1777
Comtec/Owosso (517) 725-7326
Compuduct/Grand Rapids (616) 949-0281
Computer Mart/Kalamazoo (616) 329-1000
Computerland/Grand Rapids (616) 942-2931
Computers & More/Grand Rapids (616) 243-3525
Doc's Other Computer Store/Muskegon (616) 755-3906
Heath Computer Store/St. Joseph (616) 982-3215
Professional Computer System/ St. Joseph (616) 429-9616
The Computer Room/Kalamazoo (616) 343-4634

MINNESOTA

Granada News/Duluth (218) 727-9122
Rolandson Computer Ctr./Fergus Falls (218) 736-5925
Readmore Book & Card/Mankato (507) 345-5704
Bit by Bit Computer Resource Ctr./ St. Paul (612) 646-4833
Computer Depot/Bloomington (612) 375-2008
Computer Professionals/Burnsville (612) 435-8060
Computerland (612) 559-1984
Computerland/Bloomington (612) 933-8841
Digital Den/St. Paul (612) 699-8442
Heathkit Ctr./Hopkins (612) 938-6371
Minnesota Book Center/Minneapolis (612) 373-5734
Online Computer Ctrs./Minneapolis (612) 546-8814
Personal Business Systems/Minneapolis (612) 929-4120
Readmore Bookstore/Minneapolis (612) 333-3628
Schinders's Hennepin News/Minneapolis (612) 333-6942
The Software Centre/Bloomington (612) 881-4514
Weldon Electrs./Plymouth (612) 559-1984
The Xerox Store/Edina (612) 929-4334
The Xerox Store/Minneapolis (612) 332-6866
The Xerox Store/St. Paul (612) 227-3366

MISSISSIPPI

The Book Store/Greenville (601) 332-2665
Computer World/Hattiesburg (601) 544-3135
Computerland/Jackson (601) 362-8755
Computerland/Washington County (601) 378-5861
Miss-Lou Computer Center/Natchez (601) 442-2836
Programs Unlimited/Jackson To come
Southeastern Aud. Vis./Starkville (601) 324-0797

MISSOURI

Computerland/St. Louis (314) 567-3291
Famous-Barr Computer Ctr./St. Louis (314) 241-5469
Gateway Electrs/St. Louis (314) 427-6116
Micro-Age Computer Ctr./St. Louis (314) 567-7644
Sorbus Station/Maryland Heights (314) 432-0425
Computer Mart/Springfield (417) 862-6500
House of Computers/Joplin (417) 782-0880
Commonwealth Computers, Inc./ Kansas City (816) 356-6502
Computer Core/Kirksville (816) 627-1255
Computerland (816) 436-3737
Computerland (816) 364-4498
Computerland/Independence (816) 461-6502
Midwest Computer Systems, Inc./ Carrollton (816) 542-0022
University Bookstore/NW MO. State U/ Maryville (816) 582-5151

MONTANA

Art's Electronics/Great Falls (406) 453-8543
Computerland/Billings (406) 259-0565
Computerland/Great Falls (406) 727-8700
Consolidated Services/Amissonla (406) 721-1811
Prairie Computers/Great Falls (406) 727-6992

NEBRASKA

Eakes Office Prod. Ctr./ Grand Island (308) 382-8026
Computerland/Omaha (402) 391-6716
Electronic Center/Lincoln (402) 476-7331

NEVADA

Home Computers/Las Vegas (702) 736-6363
PCS Computer Service/Las Vegas (702) 870-4138

NEW HAMPSHIRE

Bitznbytes/Concord (603) 224-8233
Computerland of Manchester (603) 668-2110
Computerland/Nashua (603) 889-5238
Computer Mart/Nashua (603) 883-2386
Computer Town/Salem (603) 893-8812
Microcon Software Centers/Manchester (603) 668-4080
North Country Computer Center/ Plymouth (603) 536-4163

NEW JERSEY

Bytes & Pieces/Jamesburg To Come
Apple Coor/Basking Ridge (201) 766-3977
Computer Corner/Pompton Plains (201) 835-7080
Computer Dimensions/Westfield (201) 232-8300
Computer Discount of NJ/Mahwah (201) 529-4026
Computerland/Paramus (201) 845-9303
Computerland/Eatontown (201) 389-2333
Computerland/Morristown (201) 539-4077
Computer Mart of New Jersey/E. Hanover (201) 428-0200
Computer Mart of New Jersey/Green Brook (201) 752-6300
Computer Mart of New Jersey/Iselin (201) 283-0600
Computer Nook/Pine Brook (201) 575-9468
Computer Technicians/E. Brunswick (201) 238-2780
Computer Universe/Paramus (201) 262-0960
Earth Rise Micro Sys./Madison (201) 822-0518
Entre Computer Center/Paramus (201) 342-0080
Felice's Follies/Red Bank (201) 842-2862
Heathkit Electr. Ctr./Fairlawn (201) 791-6935
Jefferson Computer Center/ Lake Hopatcong (201) 663-0224
Lloyd's Computers/Ridgewood (201) 445-8801
Micro Computer Svcs./Warren (201) 647-3900
Monmouth Computer Services/ Shrewsbury (201) 747-6745
Programs Unlimited/Greenbrook (201) To Come
Software City/Fairview (201) 943-9444
Software City/Teaneck (201) 692-8317
Software Network/Upper Montclair (201) 744-2952
Stonehenge Computer/Summit (201) 277-1020
The Computer Center, Inc./Montvale (201) 391-1006
Vista Computer Shop/Matawan (201) 566-6066
William Electrs Supply/Edison (201) 985-3700
Atlantic Computer Systems/Toms River (609) 240-3101

PERSONAL COMPUTING DEALERS

Bargain Brothers/Trenton (609) 883-2050
Computer Encounter/Princeton (609) 924-8757
Computer Mart of New Jersey/ Lawrenceville (609) 452-1858

NEW MEXICO

Computer Shop/Clovis (505) 762-3327
Computerland/Santa Fe (505) 988-8800
Electronic Parts Co./Albuquerque (505) 293-6161
Micro Waves Computer Store/ Albuquerque (505) 883-0955
Computer Tech Assoc./Las Cruces (915) 533-2108

NEW YORK

Computer Center/New York (212) 889-8130
Computer Discount Services/New York (212) 757-8698
The Computer Edge/Mt. Kisco (212) 664-3212
Computer Era/New York (212) 860-0500
Computerland (212) 840-3223
Computerland of Little Neck (212) 423-5280
Computerland of Wall Street/NY To Come
Comtek/Brooklyn (212) 962-6131
Comtek/Staten Island (212) 698-7050
Datel Sys./New York (212) 921-0110
Greenwich Village Computers/New York (212) 254-9191
J&R Music World/New York (212) 732-8600
Leigh's Computer World/New York (212) 879-6257
Magazine Emporium/New York (212) 864-0500
Majority New Dist./New York (212) 243-7770
Papyrus Books/New York (212) 864-8862
Programs Unlimited of Smithaven To Come
Software City/Forest Hills (212) 261-1141
Super Business Machines/New York (212) 964-6666
Compu-Tech/Camillus (315) 471-7773
Computerland/Massina (315) 769-9971
Computers Etc./Syracuse (315) 446-6502
Omnifax Computer Store/Syracuse (315) 446-1284
Radio World, Inc./Oriskany (315) 736-0184
Computer Headquarters/Selden (516) 698-8636
Computer Microsystems/Manhasset (516) 627-3640
Computer Shoppe/Patchogue (516) 758-6558
Computerland/Little Neck (516) 887-4747
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Data Scan Comp. Sys./Farmingville (516) 698-6285
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Heathkit Electrs./Jericho (516) 334-8181
Programs Unlimited/Jericho (516) 997-8668
Spartan Electrs/Commack (516) 499-9500
Syosset Video & Electrs./Syosset (516) 921-5454
Castle Computers/Latham (518) 783-9405
Computer Room/Albany (518) 869-3818
Foothills Computer/Glens Falls (518) 792-0369
Future Distribution/Mooers (518) 561-5703
Lela Computer Suitors/Albany (518) 272-2691
Computer Tree/Endwell (607) 748-1223
Computerland/Ithaca (607) 277-4888
Computerland/Johnson City (607) 277-4888
Unicorn Electronics/Johnson City (607) 798-0260
Computer Resource/Williamsville (716) 633-9510
Computerland/Rochester (716) 586-0378
Home Computer Ctr./Rochester (716) 244-6237
Micro Age Computer Store/Rochester (716) 244-9000
Modern Tek Shop, Inc./Snyder (716) 839-5800
Readout Computers/Buffalo (716) 634-9354
All Things Computer/Scarsdale (914) 723-6262
Computer Corner/White Plains (914) 949-3282
Computer Store/White Plains (914) 428-1661
Computerland of Rockland/New City (914) 638-4440
Heathkit/N. White Plains (914) 761-7690
Mr. Computer/Wappinger Falls (914) 297-1223
Mr. Oz News Center Book Store/ New City (914) 638-0990
Programs Unlimited/White Plains (914) 761-9283
Software Etc./Central Nyack (914) 358-3004

NORTH CAROLINA

Computer Alternatives/Asheville (704) 274-5404
Computer Alternatives/Hickory (704) 324-2040
Computeroom/Charlotte (704) 377-9821
Computer Alternatives/Wilmington (919) 799-5440
Computerland/Greenville (919) 355-6110
The ComputerWare Store/Jacksonville (919) 346-8499
K & S Newstand/Winston-Salem (919) 724-7537
The Program Center/Greensboro (919) 454-4708
Worldwide News & Specialties/Cary (919) 467-7130

NORTH DAKOTA

Computer 1/Fargo (701) 282-9471
Computerland/Fargo (701) 237-3069
Computerland Minot/Minot (701) 838-1266

OHIO

All Media Material/Kent (216) 678-5499
Cleveland Computer Co./Mentor (216) 946-1722
Computer Warehouse/Euclid (216) 481-1600
Computer-Site/Strongsville (216) 572-7483
Computerland/Akron-Canton (216) 493-7786
Computerland of Cleveland/ N. Olmstead (216) 461-1200
Computerland/Warren (216) 544-4191
Computer World/N. Canton (216) 478-0033
The Corner Store/Median (216) 722-2777
Cosmic Comics/Cleveland (216) 784-3449
Hudson Computer/Hudson (216) 653-9010
News Depot/Canton (216) 454-4444
The Newstand/Cuyahoga Falls (216) 235-9321
North Coast Computers/Bay Village (216) 835-4345
Video & Computer Place, Inc./Medina (216) 722-0770
Abacus II/Toledo (419) 865-1009
CP & You/Toledo (419) 535-0130
Leo's Book & Wine Shop/Toledo (419) 255-5506
The Open Book/Findlay (419) 423-1283
Programs Unlimited/Mansfield Hgts. To Come
Electronic Connexion/Kettering (513) 294-0222
Future Now/Cincinnati (513) 791-4700
Micro Computer Ctr./Dayton (513) 435-9355
News - Readers/Fairborn (513) 879-4444
Micro Age Computer Store/Columbus (614) 868-1550
Micro Center/Columbus (614) 486-5381
Computerland/Youngstown To Come

OKLAHOMA

Book Shack/Enid (405) 233-1588
Computer Service Unlimited/Norman (405) 329-2154
Computer Works/Stillwater (405) 624-5276
Computerland/Oklahoma (405) 755-5200
Computerland of Oklahoma/ Oklahoma City (405) 634-4300
Employee's Assoc. Bookstore/Okla. City (405) 686-4295
High Technology Retail/Oklahoma City (405) 528-8008
Micro Age Computer/Oklahoma City (405) 728-1837
University Ctr. Book/Edmond (405) 341-2980
American Small Business Computers/ Pryor (918) 825-4844
Computer Store/Tulsa (918) 224-5347
Computerland/Tulsa (918) 481-0332
MicroAge Computer Store/Tulsa To Come

OREGON

Computer Solutions/Eugene (503) 689-9677
Computer Specialties/Salem (503) 399-0534
Computer Store/Corvallis (503) 754-0811
Computerland/Portland (503) 620-6170
Compuware/McMinnville (503) 472-2972
Fifth Avenue News/Portland (503) 222-7462
Hood River Computers/Hood River (503) 386-9311
Pegasus Computer Store/Portland (503) 256-4713
New Day Computing/Portland (503) 223-8033
Rich Cigar Store/Portland (503) 228-1700

PENNSYLVANIA

A B Computers/Montgomeryville (215) 822-7727
Bookarama/Allentown - Whitehall To come
Computer Forum/Frazer (215) 296-3474
Computerland/Dresher (215) 542-8835
Computerland/Lancaster (215) 436-0422
Computerland Lehigh Valley/Allentown Whitehall Lehigh Valley (215) 776-0202
Computerland/Paoli (215) 296-0210
Computerland/Philadelphia (215) 568-9930
The Computer Source/W. Reading (215) 375-4231
Doc's Computer Supply Center/Ardmore (215) 642-6550
Drexel University Book Store/ Philadelphia (215) 895-2000
Heathkit Electr. Ctr./Frazer (215) 288-0180
Heathkit Electr. Ctr./Philadelphia (215) 288-0180
Intelligent Electronics/Lionville (215) 524-1800
Main Line Computer Center/Wayne (215) 687-8500
Marketline Sys./Southampton (215) 355-5400
Micro Computer Center/Media (215) 565-1380
Never Ltd., Personal Software/Malvern (215) 296-2726
Robec, Inc./Line Lexington (215) 822-0700
Solutions Computer Store/Doylestown (215) 345-4411
Sorbus Station/King of Prussia (215) 337-9800
Tree of Knowledge/Reading (215) 779-8131
Video Village Computer Center/ Philadelphia (215) 969-5270
The Computer Center/Greensburg (412) 834-7636
Computer House/Pittsburgh (412) 921-1333
Pittsburgh Area Computer/Glenshaw (412) 931-5005
Pittsburgh Computer Store/Pittsburgh (412) 391-8050
Computers Unlimited/York (717) 755-1045
One Stop Computer Shoppe/Le Moyne (717) 761-6754
Computerland Harrisburg/ Mechanicsburg (814) 533-6892
Erie Computer Co./Erie (814) 454-7652

RHODE ISLAND

Abacus Computer Svcs./Providence (401) 274-3061
Computerland/Providence (401) 274-5100

SOUTH CAROLINA

Colsmo Comm/Rockhill (803) 366-7157
Computer Source/Carleston (803) 763-0201
Computerland/Anderson (803) 224-5428

SOUTH DAKOTA

Computerland/Rapid City (605) 348-5384
Computerland/Sioux Falls (605) 338-5263

TENNESSEE

Campus Computers/Nashville (615) 327-9123
Chattanooga Computer Ctr. (615) 892-7038
Computerland of Chattanooga (615) 892-0840
Computerland/Knoxville (615) 693-8225
Computerland of Nashville (615) 292-8088
Computer South, Inc./Chattanooga (615) 892-7659
Eastern Micro Computer/Knoxville (615) 594-8365
MicroAge Computer Store/Nashville (615) 327-9669
Rush Elects/Bristol (615) 764-0831
Computer Lab/Memphis (901) 761-4743
Computerland/Memphis (901) 767-0233
Tobacco Corner/Memphis (901) 682-3326

TEXAS

Compu Shop/Richardson (214) 783-1252
Computer Video Sys./Plano (214) 423-3654
Computerland/Richardson (214) 363-2223
Computerland/Tyler (214) 581-7000
Marketland/Richardson (214) 680-2820
Simtec/Dallas (214) 484-3319
Software Access/Irving (214) 255-5615
Software Concepts/Dallas (214) 458-0330
Softwares/Dallas (214) 644-5043
Strictly Software/Dallas (214) 392-3030
U.S. Software/Dallas (214) 357-7800
Capital Micro/Austin (512) 472-7590
Computer Solutions/Austin (512) 327-8393
Computer Solutions/San Antonio (512) 341-8851
Computer To-Go/Austin (512) 472-8926
Computerland/Austin (512) 452-5701
Douglas Electronics/Corpus Christi (512) 883-5103
Expensive Toys/Big Boys/San Antonio (512) 340-5600
Heathkit/San Antonio (512) 341-8876
The Homing Pidgeon/Elgin (512) 276-7962
The Right Stuff/Austin (512) 346-1321
The Software Place/Austin (512) 453-0851
City Electr. Supply/Houston (713) 621-1060
Computer Center/Houston (713) 527-8008
Computer Galleries/Houston (713) 956-0900
Computerland Houston Bay/Houston (713) 488-8153
Computerland/Westwood (713) 270-1200
Computerland of Brazos Valley (713) 846-2378
Computerland of Pasadena (713) 473-1200
D. Armstrong Co., Inc./Houston (713) 957-4818
Gateway Electrs./Houston (713) 978-6575
Lone Star News/Houston (713) 981-0288
Micro Age Computer Store/Houston (713) 943-2124
Micro Age Computer Store/Houston (713) 270-9647
Micro Age Computer Store/Houston (713) 440-7547
Northwest Newstand/Houston (713) 681-7310
Simtec/Houston To Come
Waghalter Books/Houston (713) 627-9970
Westheimer Newstand/Houston (713) 781-7793
The Xerox Store/Houston (713) 972-1791
The Xerox Store/Houston (713) 654-8913
The Xerox Store/Richardson To Come
Young Electrs./College Station (713) 693-8080
Agriplex Computers/Lubbock (806) 797-4495
Computerland/Waco (817) 776-6700
Computer Port/Arlington (817) 469-1502
Computer Pro/Ft. Worth (817) 654-3360
Computer Vision/Arlington (817) 274-6608
Heathkit/Ft. Worth (817) 737-8822
Computer Tech Assoc./El Paso (915) 533-2108
Computer Technology Assoc./Midland (915) 699-5046
Computer West/San Angelo (915) 655-3391

UTAH

Computerland/Orem (801) 224-2608
Computerland/Salt Lake (801) 364-4416
Hi-Fi Shop/Datalines/Ogden (801) 621-5244
Quality Technology/Salt Lake City (801) 521-5040

VERMONT

Datatronics Inc./Brattleboro (802) 257-0555
Video Connection/Brattleboro (802) 254-6026

VIRGINIA

Computer Store/McLean (617) 272-0294
Computer Works/Harrisonburg (703) 434-1120
Computers Plus/Alexandria (703) 971-1996
Computerland/Woodbridge (703) 491-4151
Computerland Tysons Corner/Vienna (703) 893-0424
H.B. Computer Ctr./Charlottesville (703) 295-1975
Heathkit Electrs./Alexandria (703) 765-5515
Home Computer Ctr./Newport News (703) 595-1955
Jack L. Hartman & Co., Inc./Roanoke (703) 362-1891
On Line Computer Centers/Fairfax (703) 280-1600
Program Store/Falls Church (703) 536-5404
Virginia Micro Sys./Woodbridge (703) 491-6502
V.P.I. Facilities/Blacksburg (703) 961-5991
The Program Store/Vienna (703) 556-9778
The Xerox Store/Fairfax (703) 591-8845
The Xerox Store/Vienna (703) 442-9655
University Computers Inc./Alexandria (703) 379-0367
Charlottesville Bus Computer/ Charlottesville (804) 971-4888
Computerland/Charlottesville (804) 973-5701
Computerland/Norfolk (804) 625-3427
Computerland/Richmond (804) 741-3536
Data Base/Richmond (804) 282-1817

WASHINGTON

A B C Comm./Seattle (206) 364-8300
Almac-Stroum/Bellevue (206) 643-9992
Amateur Radio Supply Co./Seattle (206) 767-3222
Byte Shop/Seattle (206) 622-7196
Central Computers/Bellevue (206) 746-5227
City News/Bellevue (206) 455-9683
Computer & Video Ctr./Vancouver (206) 695-1540
Computerland (206) 581-0388
Data-Borne Computers/Renton (206) 248-0101
Empire Electrs./Seattle (206) 244-5200
Heathkit/Seattle (206) 682-2172
Heathkit/Tukwila (206) 246-5357
Swan Computers, Inc./Bellevue (206) 454-6272
Western Micro Computer Ctr./ Bellingham (206) 676-9558
The Xerox Store/Redmond (206) 643-2600
The Xerox Store/Tukwila (206) 575-1212
Alpha Computer Sys./Kennewick (509) 586-7603
Computer Systems/Yakima (509) 248-8309
Rob Roy Computer Shop/Yakima (509) 575-7704

WISCONSIN

Asmus Electronics/Fond Dulac (414) 923-4107
Byte Shop/Milwaukee (414) 281-7004
Chester Electr. Supply/Kenosha (414) 658-4616
Computer Plus, Inc./Milwaukee (414) 321-1770
Computerland of Ozaukee/Mequan (414) 242-9490
Computers Unlimited/Milwaukee (414) 355-5206
Computerworld/Appleton (414) 733-9547
Digital Den/Wauwatosa (414) 475-6020
Four J's/Milwaukee (414) 466-8990
North Shore Computers/Milwaukee (414) 963-9700
Prospect News/Milwaukee (414) 276-6110
American Computer Sys./Madison (608) 257-1348
Computerland/LaCrosse (608) 781-2090
Computerland/Madison (608) 273-2020
Computerland/Eau Claire (715) 835-8082

WEST VIRGINIA

Computer Store/Charleston (304) 345-1360
Computerland/Clarksburg (304) 624-6409
Computerland/S. Charleston (304) 744-7962
Computerland/Parkersburg (304) 485-6823
Nicks News/Huntington (304) 697-2459

WYOMING

Computerland/Cheyenne (307) 634-9552

CANADA

Galatica Computers (403) 424-7007
Micron Dist. (416) 361-0609
Lichtman's News (416) 961-1466
Computer Circuit (510) 672-9370
Computer World (604) 732-1485

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5. 5¼ inch for Osborne I Microcomputer $25 for Protected File - add $20 for Microsoft BASIC-80 Source

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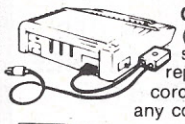
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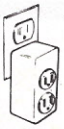


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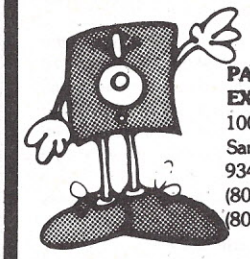
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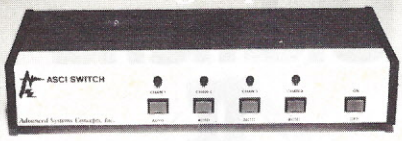
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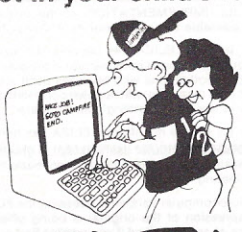


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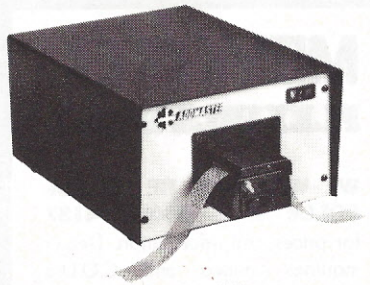
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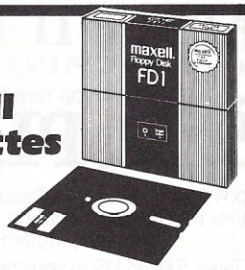


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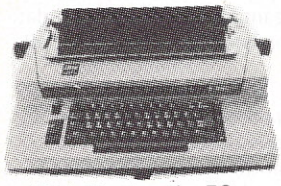


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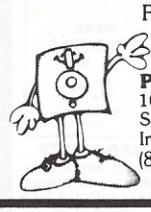
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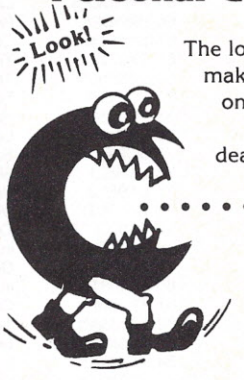
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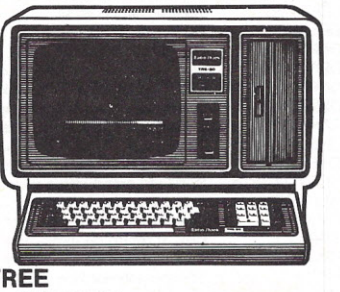
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62	MERGANAL	Merger analysis computations
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64	NPV	Net present value of project
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Circle No.		Page No.
115	Aardvark Technical Services	166
201	Addmaster Corp.	276
	Advanced Computer Products	256-14
199	Advanced Systems Concepts, Inc.	276
24	Amdek Corp.	82
	American Software Club	256-11
	Anderson-Bell	206
22	Apple Computer Inc.	30, 31
163	Appleware, Inc.	256-17
	Applied Creative Technology, Inc.	23
118	Applied Software Technology, Inc.	131
192	Artificial Intelligence	275
213	Atsuko	277
129	BASF Systems Corp.	255
28	Bausch & Lomb/Instr. & Syst. Div.	42
	Bottom Line	256-15
5	BPI Systems Inc.	10
126	BRS	159
132	Business Solutions	268
	Byte Book Club	33
55	California Computer Systems	267
124	CBS Software	248
110	CDex	225
61	Chang Labs	174
150	Check-Mate	256-23
82	CLOAD	150
45	Columbia Data Products, Inc.	162
145	Commodore	C-4
106	Compaq Computer Corp.	210
	Compuco	256-12
190	CompuMart Corp.	275
36	CompuServe	184, 185
107	Compushack	212, 213
	Computer Apparatus	256-17
63	Computer Assoc.	163
	Computer Case Co.	256-4
43	Computer Devices	104, 105
	Computer Discount of America	256-19
	Computer Discount Products	256-22
10	Computerland	253
83, 114	Computerline	180, 234
112	Computer Mail Order	228, 229
	Computer Outlet	256-2, 256-3
42, 48	Computer Peripherals	87, 125
	Computer Registration Center of America	256-23
	Computer Shopper	256-5
117	Computer Specialties	237
	Computer Warehouse	256-24
	Computronics	88, 278
	Compuway, Inc.	256-16
131	Consumer Computer	266
127	Contract Services Assoc.	188
6	Corvus Systems	14
121	CPU Shop	244
109	Cromemco	215
	Customware Computer Cnslts.	256-23
151	Cybernetics	251
204	Cybertext Corp.	276
89	Data Based Solutions	195
	Datagrant	256-9
73	Data Royal	172
27	Davong Systems, Inc.	36
193	DB/DC Software Assoc.	275
	Digital Equipment Corp.	106, 107
	Dilithium Press	256-20
	Diskette Connection	256-5
	Dow Jones	39, 40, 41
141	Dresselhaus	181
56	Dynacomp	134
21	Dysan Corp.	160, 161
12	Easton Press	16, 17, 18, 19
16	800-Software	22
31	Electronic Protection Devices	199
35, 96	Epson America, Inc.	66, 168, 169
	Excel Unlimited	277
197	Executive Data Systems	275
33	Franklin Computer Corp.	75
93	Frederick E. Deeg & Assoc.	189
	Gamut	256-17
120	Garden of Eden	254
92	Genie Computer Corp.	194
	The Happy Computer	256-11
69	Harcourt Brace & Jovanovich	163
	Harmony Video	256-27
	Harrison Radio	256-4, 256-5
	Hayden Book Co.	240, 241,
	Hayden Book Co.	256-9, 256-18, 256-31
	Hayden Software Co.	257-264
9, 34	Hayes Microcomputer Products, Inc.	4, 226
86	Hazeltine Corp.	232
40	Heath Co.	80, 81
20	Hewlett-Packard/PCD	26
75, 139	Howard Sams	173, 175
	Howard Software	167
3	IBM Corp.	6, 7
191	ICS Computer Training	275
	I/O Management Corp.	256-20
72	Independent Investors Forum	182
85	Inmac	238
119	International Micro Systems	242
84	ITM	165
111	Jimscot, Inc.	256-8
143, 144	Leading Edge	280, C-3
	Learning Shack	221
	Library of Computer & Info. Sci.	177
67	Lighthouse Data	176
	Lotus Development Corp.	24, 25
154	Madison Cameras	256-20
90	Mannesmann Tally	186
	Master Electronics	256-4
81	Maxell	178
136	Memory Technologies	239
66	Memotech	47
	MFJ Enterprises	256-30
64	Micro Age Computer Stores	158
135	Micro Business World	271
	Microcom	245
	Micro Data Supplies	256-21
137	Microhouse	247, 256-10
152	Micro Management	256-26
26	Microsoft	192, 193
29	Microstuf, Inc.	54
	Micro Systems, Inc.	256-12
	Microtek	256-6
125	Monument Computer Corp.	252
2	Mountain Computer	1
	National Computer Center	256-9
172	NEBS Computer Forms	235
1, 7, 8, 11	NEC, America	C-2, 11, 13, 15
18	NEC Info Systems	55
63	Novation, Inc.	156, 157
	NRI Schools	133
14	Okidata Corp.	28
41	Omega Microware, Inc.	86
70	Omega Sales	164
4	Osborne Computer Corp.	8
102	Osborne-McGraw Hill	208,209
195, 205	Pacific Exchanges	275, 276
101	Palomar	204
80	Panasonic	52, 53
	PC Software	256-27
147	Percom	48
133	Personal Computer Systems	269
	Phaser Systems	129
	The Picture House	256-16
148	Pi-Tech Limited	256-8
23	Plus Computer Technology, Inc.	93
194	Prasek Computer Systems, Inc.	275
108	Program Design, Inc.	214
	Programmers Institute	256-25
58	Programming International	140, 141
15	Quadram	216, 217
59	Quark Engineering	151
134	Quic-N-Easi Products, Inc.	270
62	Qume	154, 155
116	Racet Computes Ltd.	236
37	Radio Shack	69
44	Rana Systems	120, 121
19	RCA	95
	Readers Digest Services, Inc.	276
130	Red Baron	256
128	Redgate Publishing Co.	243
97	Rixon, Inc.	196
	R.H. Electronics, Inc.	256-28, 256-29
140	Saturn Systems	32
203	Sculpture by Softouch	276
32	Seiko	63,64,65
	Selectone Corp.	256-30
57	Sierra On-Line	249
	Sinclair Research	45
68	Softrend	179
	Softsales	256-19
123	Software Dimension	265
149	Software Models	256-10
94	Software Publishing	148, 149
	Software Training Co.	256-31
87	Solutions, Inc.	182
	Sorcim	112, 113
95	Source Telecomputing Corp.	190
	Spectrum	256-32
103,104,105	SSM	203, 205, 207
30	Standard & Poors Corp.	118
52	State of the Art	130
	Sunlock Systems	256-12
46	Supersoft	170
113	Sybex	231
207	Symphony Press, Inc.	277
50	Syncom	223
100	Systems Plus	94
198	Tayco Business Forms	276
202	Tech-Data Corp.	276
17	Tecmar	202
99	Televideo Systems	200, 201
39, 60	Texas Instruments, Inc.	76, 152, 153
206	T.H.E.S.I.S.	277
200	TimberTech Computer Camp	276
47	Trace Systems	224
	Transaction Storage Systems	256-7, 256-13
208	Triplanet	277
53	TSK Electronics Corp.	119
51	Universal Data Systems	20
88	Ven-Tel	183
49	Verbatim	126
13	Videx	34
	VisiCorp.	250
77	Visionary Electronics	179
38	Vista	70
146	Votrax	211
91	Vynet	246
74, 122	Wadsworth Publishing Co.	197, 238
76	Wall St. Journal/Dow Jones	219
	Westico, Inc.	132
196	Westworld Computer Supplies	275
	Wisconsin Discount Sales	233
	Woodstown	277
	Wood Works	218
	XPS Inc.	256-10

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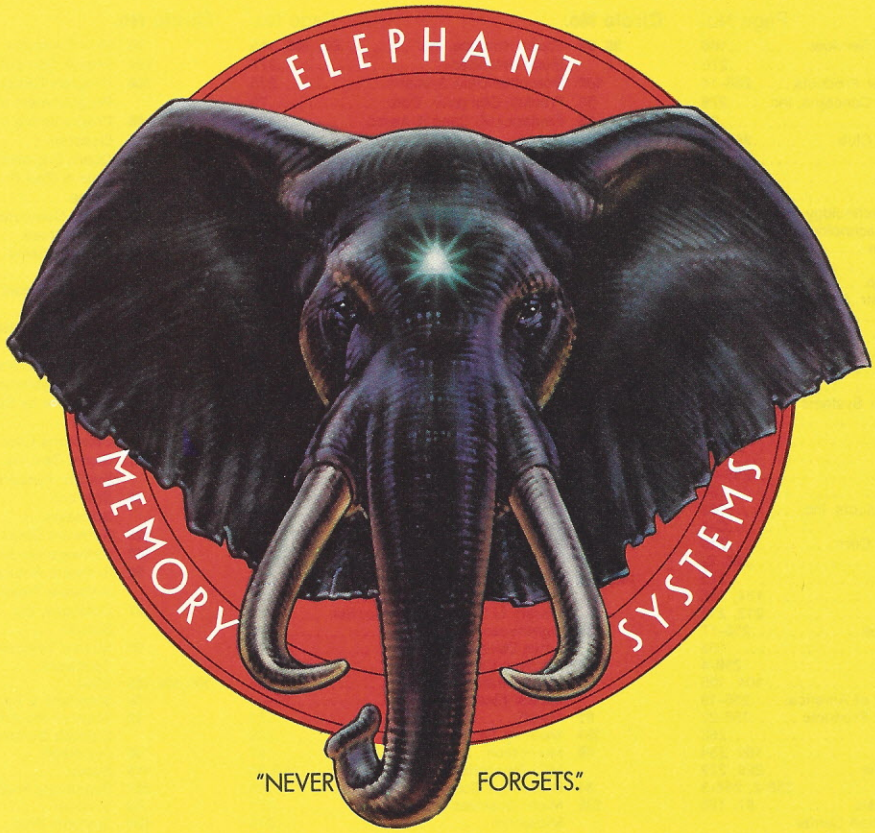
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REMEMBER:



MORE THAN JUST ANOTHER PRETTY FACE.

Says who? Says ANSI.

Specifically, subcommittee X3B8 of the American National Standards Institute (ANSI) says so. The fact is all Elephant™ floppies meet or exceed the specs required to meet or exceed all their standards.

But just who is "subcommittee X3B8" to issue such pronouncements?

They're a group of people representing a large, well-balanced cross section of disciplines—from academia, government agencies, and the computer industry. People from places like IBM, Hewlett-Packard, 3M, Lawrence Livermore Labs, The U.S. Department of Defense, Honeywell and The Association of Computer Programmers and Analysts. In short, it's a bunch of high-caliber nitpickers whose mission, it seems, in order to make better disks for consumers, is also to make life miserable for everyone in the disk-making business.

How? By gathering together periodically (often, one suspects, under the full moon) to concoct more and more rules to increase the quality of flexible disks. Their most recent rule book runs over 20 single-spaced pages—listing, and insisting upon—hundreds upon hundreds of standards a disk must meet in order to be blessed by ANSI. (And thereby be taken seriously by people who take disks seriously.)

In fact, if you'd like a copy of this formidable document, for free, just let us know and we'll send you one. Because once you know what it takes to make an Elephant for ANSI . . .

We think you'll want us to make some Elephants for you.

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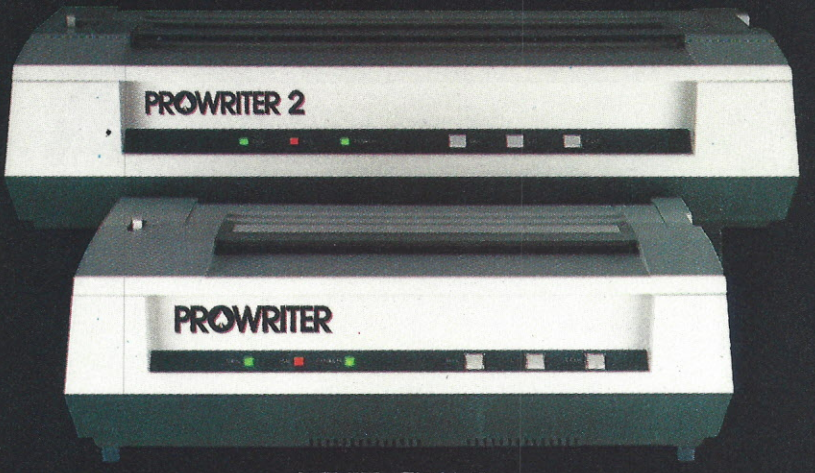
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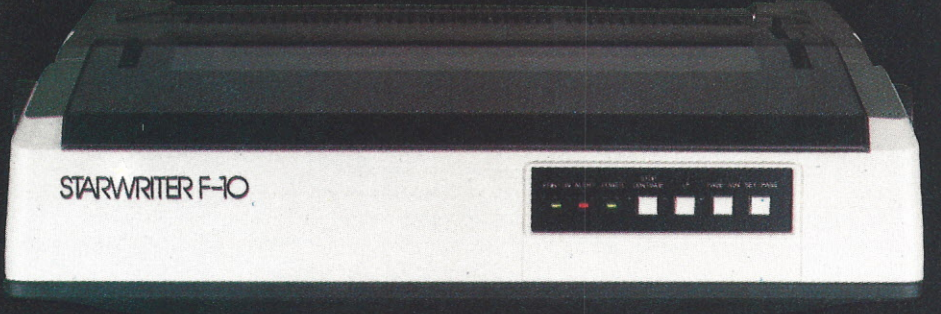
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The Prowriters: business printers—and more. The "more" is a dot-matrix process with more dots. It gives you denser, correspondence quality copy (as opposed to business quality copy, which looks like a bad job of spray-painting).
Prowriter: 120 cps. 80 columns dot matrix compressable to 136. 10″ carriage. Parallel or serial interface.
Prowriter 2: Same as Prowriter, except 15″ carriage allows full 136 columns in normal print mode. Parallel or serial interface.



THE STAR.

The Starwriter F-10. In short (or more precisely, in a sleek 6″ high, 30-pound unit), it gives you more of just about everything—except bulk and noise—than any other printer in its price range. It's a 40 cps letter-quality daisy-wheel with a bunch of built-in functions to simplify and speed up word processing. It plugs into almost any micro on the market, serial or parallel.



THE MASTER.

The Printmaster F-10. Does all the same good stuff as the Starwriter except, at 55 cps, the Master does it faster.



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HOME IS THE LAST PLACE YOU SHOULD LEARN ABOUT A HOME COMPUTER.



WANT TO LEARN SOMETHING ABOUT HOME COMPUTERS? HERE, IT'S FREE. AT HOME, IT COULD COST YOU.

No one expects you to know everything about a home computer before you buy it. A fact which is not lost on our competition.

They know that an impressively low price can divert your attention from some depressingly cheap features. So that you won't know what you may be missing with their home computer until after it's been in your home for a while.

At which point, naturally, it'll cost you to change your mind.

IT'S EASY TO TELL THE DIFFERENCE.



Fortunately, you don't have to be a computer engineer to tell what makes the Commodore VIC 20™ superior to the competition. All you have to do is take advantage of three of your five senses.

Use your sense of vision and read this comparison chart. You can see in black and white where two of our major competitors have skimped. Use your sense of touch in the store. You'll feel the VIC 20's superiority immediately. It feels a lot more expensive than it is.



If these two senses don't convince you that the VIC 20 offers more for the money than any other home computer, simply rely on common sense.

NOW THAT YOU KNOW HOW EASY A COMMODORE HOME COMPUTER IS TO OWN, FIND OUT HOW EASY IT IS TO EXPAND.

One thing about home computers that you're bound to discover at home is that, once you learn what they can do, you'll want them to do more and more. To do this, you may need accessories called peripherals. These let you get more out of a home computer by letting you put more into it.

They include items like cassette recorders and disk drives to input data, modems for telecomputing and printers. And all VIC 20 peripherals are fully compatible with the powerful Commodore 64™ personal computer.

PLAN AHEAD.

When you start looking at your first home computer, you may think it's too early to start planning to add peripherals. If that's what you think, you're once again playing right into the hands of our competitors.

Because once they've gotten you to buy their home computer, for what seems to be a reasonable price, they have you hooked on their system.

The costs of which, if you'll examine the chart below, can really start getting unreasonable. For example, while these computers may seem to be close to the same price to start, an expanded system can cost you twice as much with TI or Atari as with the Commodore VIC 20 or Commodore 64.

EXPANSION COSTS	VIC 20™ or COMMODORE 64™	TI99/4A®	ATARI 400®
BASIC	Included	Included	$59.95
Peripheral Expansion System	Not Necessary	$249.95	Not Necessary
Disk Drive	$399.00	399.95	599.95
Disk Controller Card	Included	249.95	Included
Modem	109.95	224.95	199.95
Modem Interface	Included	174.95	219.95
TOTAL	**$508.95**	**$1299.75**	**$1079.80**

Manufacturer's suggested list prices: Prices per TI June-December 1982 U.S. Consumer Products Suggested Price List. Atari prices effective July 1, 1982 Suggested Retail Price List.

THINK OF IT AS BUYING A TOASTER.

It's easy to fill up a computer ad with RAM's and ROM's, numbers and technical jargon. But when it comes right down to it, buying a home computer is just like buying anything else. It's important to know just what you're getting for your hard-earned money.



And we hope we've accomplished that here by telling you about the cost of expanding your Commodore VIC 20 or Commodore 64 computer.

COMPUTER FEATURES	VIC 20	TI 99/4A	ATARI 400
Typewriter Keys	**Yes**	Yes	No
Typewriter Feel	**Yes**	No	No
Color Control Keys	**Yes**	No	No
Graphics on Keys	**Yes**	No	No
Reverse Letters	**Yes**	No	Yes
Programmable Function Keys	**Yes**	No	No
Works with TV or Monitor	**Yes**	Yes	No
True Lower Case Letters	**Yes**	No	Yes
DISK FEATURES			
Capacity	**170K**	90K	88K

commodore COMPUTER

CIRCLE 145

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